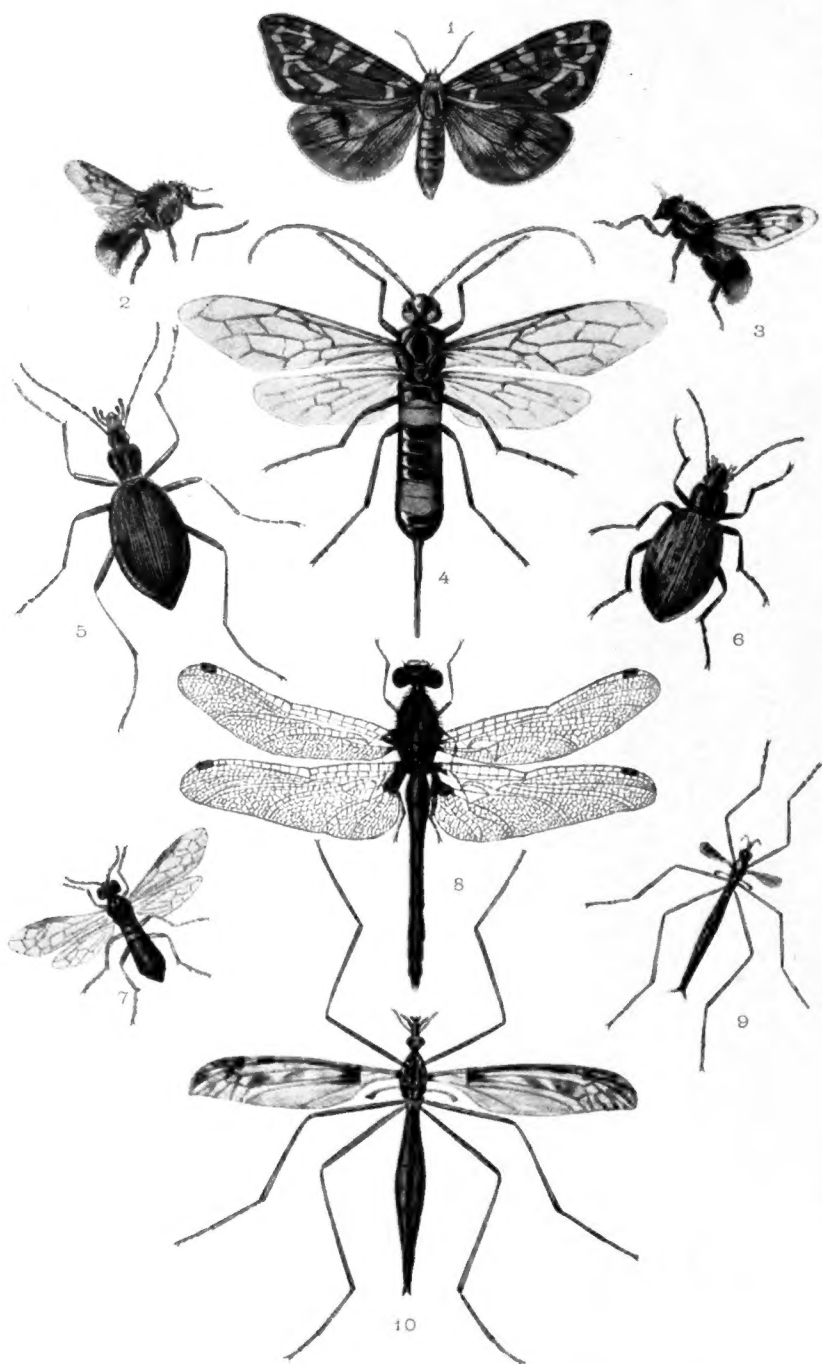


ALASKA

VOLUME VIII

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ALASKA INSECTS

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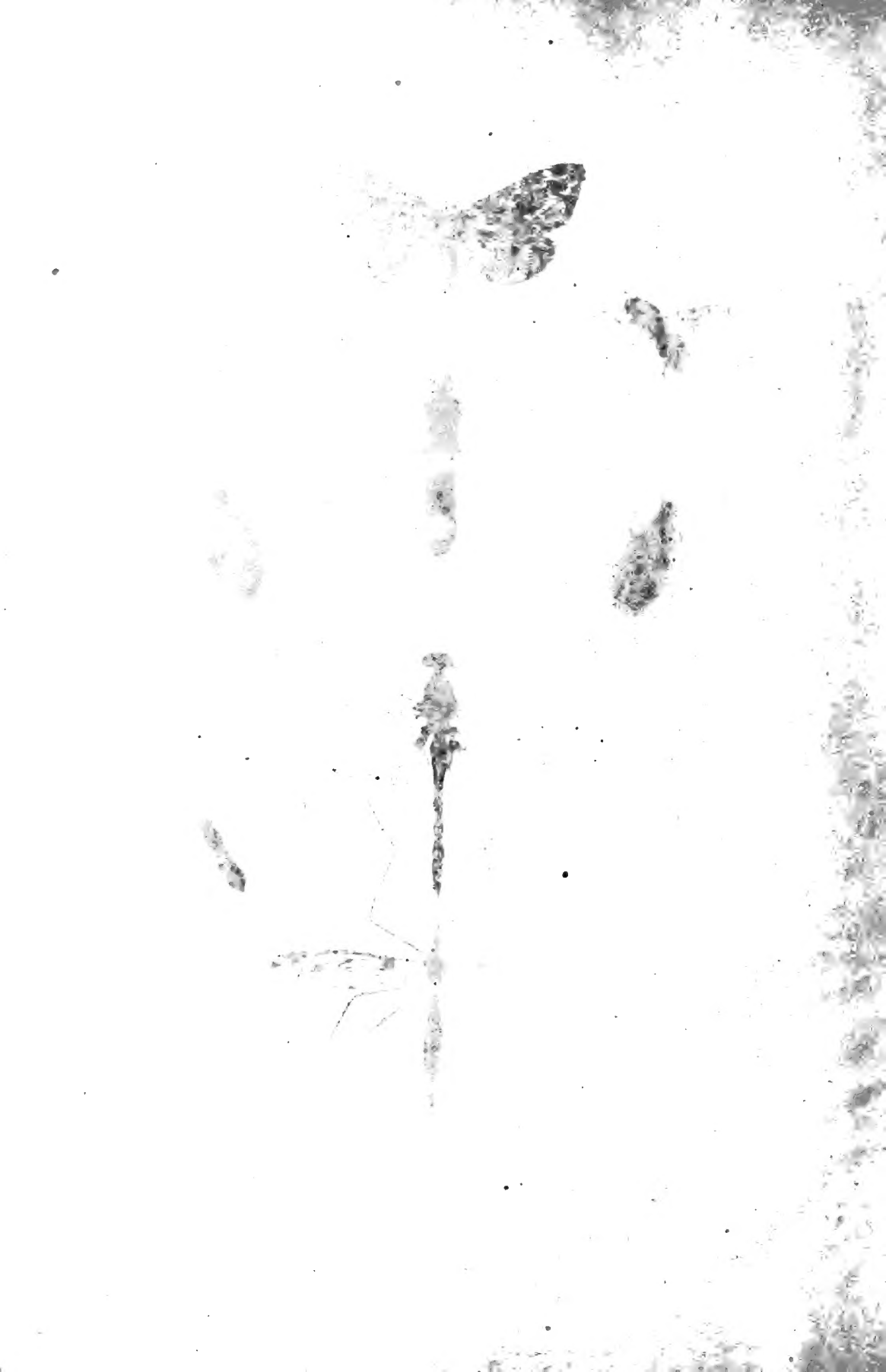
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SMITHSONIAN INSTITUTION

HARRIMAN ALASKA SERIES

VOLUME VIII

INSECTS

PART I

BY

WILLIAM H. ASHMEAD, NATHAN BANKS,
A. N. CAUDELL, O. F. COOK, ROLLA P. CURRIE,
HARRISON G. DYAR, JUSTUS WATSON FOLSOM,
O. HEIDEMANN, TREVOR KINCAID,
THEO. PERGANDE, and E. A. SCHWARZ



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ADVERTISEMENT.

The publication of the series of volumes on the Harriman Alaska Expedition of 1899, heretofore privately printed, has been transferred to the Smithsonian Institution by Mrs. Edward H. Harriman, and the work will hereafter be known as the Harriman Alaska Series of the Smithsonian Institution.

The remainder of the edition of Volumes I to V, and VIII to XIII, as also Volumes VI and VII in preparation, together with any additional volumes that may hereafter appear, will bear special Smithsonian title pages.

SMITHSONIAN INSTITUTION,

WASHINGTON, D. C., JULY, 1910

HARRIMAN ALASKA EXPEDITION
WITH COOPERATION OF WASHINGTON ACADEMY OF SCIENCES

ALASKA

VOLUME VIII

INSECTS

PART I

BY WILLIAM H. ASHMEAD, NATHAN BANKS, A. N. CAUDELL,
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KINCAID, THEO. PERGANDE AND E. A. SCHWARZ



NEW YORK
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1904

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PREFACE

THE entomologist of the Harriman Alaska Expedition was Trevor Kincaid, Professor of Biology in the University of the State of Washington, at Seattle. His zeal and activity may be inferred from the fact that in two months he obtained about 8,000 insects, representing a thousand species. On the return of the Expedition this material was distributed to a dozen specialists, who have worked up the various groups. The resulting papers, 18 in number, are here brought together in two volumes.

The collections contained at least half a dozen new genera, 344 new species, and a still larger number previously unknown from Alaska.

In most instances the special papers deal only with the material brought back by the Expedition, but in a few cases, as in the Hymenoptera, the previously known records from Alaska are added, so that the paper presents a summary of existing knowledge of the group. In one little known group (the Myriapoda) the available data for northwestern North America are assembled. The resulting paper, it is believed, will be of great value to future workers in this neglected field.

In a few instances authors have treated the types of their new species in a very loose manner, in some cases recording specimens from numerous localities, stretching along the coast for more than a thousand miles, as "type specimens" of a single species! The Editor wishes to disclaim responsibility for the nebulous and undifferentiated conception of a type implied in statements of this kind.

A number of the papers have been published in the Proceedings of the Washington Academy of Sciences, and are here reprinted from the same electrotype plates, so that they may be quoted as the original. Facing each of these papers in an ex-

planatory page giving a detailed account of the changes made in the present volume. The Introduction, by Professor Kincaid, and the papers on Myriapoda and Homoptera, are now published for the first time.

C. HART MERRIAM,
Editor.

WASHINGTON, D. C.,
May 1. 1903.

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THE INSECTS OF ALASKA

INTRODUCTION

BY TREVOR KINCAID

THE voyage of the Harriman Alaska Expedition gave an opportunity for an entomological reconnaissance of the coastal regions of Alaska. As no such opportunity had previously occurred, and as the writer was the only member of the party especially interested in this branch of science, the duty devolved upon him of securing as large a representation as possible of the insect fauna. Fortunately the conditions were more favorable than is usually the case in explorations of these northern latitudes. Every convenience that experience could suggest had been provided through the forethought of those in charge of the Expedition, and the work was further facilitated by the careful organization of the party. Moreover, the labors of the collector were only slightly interfered with by unpropitious weather, which is the more remarkable in a region noted for its excessive humidity and long-continued rains.

Recognizing the fact that almost nothing was known concerning the insect fauna of Alaska outside of the orders Coleoptera and Lepidoptera, a special effort was made to secure representatives of those groups which, from the small size or obscure habits of their members, had not hitherto been collected in the Territory. This endeavor was so successful that the resulting collection contains by far the most extensive general series of insects ever brought from the region. It will enable entomologists to form an idea of the rich field that awaits them in this vast northern possession of the United States.

The collection embraced in all more than 5,500 pinned insects, together with a considerable series of Arachnida, Myriapoda, and larval forms preserved in alcohol, making a total of about 8,000 specimens. With this material was combined, after the return of the Expedition, a small series of Alaska insects collected by the writer while with the Fur Seal Commission in 1897, and a few specimens derived from other sources which happened to be present in the collections of the U. S. National Museum.

The collections were made between the first of June and the first of August, 1899. Except a small number of specimens obtained in British Columbia, all of the material was collected in Alaska. Most of the stops were made going northward and westward, a few on the return journey. Collections were made at the following localities, which for convenience are arranged in geographical sequence, with date of visit: Lowe Inlet, June 3; Fox Point, July 26-27; Metlakatla, June 4; Farragut Bay, June 5; Taku Inlet, June 5-6; Juneau, June 6-8 and July 25; Muir Inlet, June 8-12; Sitka, June 14-17; Yakutat Bay, June 18-23; Virgin Bay, Prince William Sound, June 25-26; Orca, Prince William Sound, June 27; Seldovia, Kenai Peninsula, July 21; Kukak Bay, Alaska Peninsula, June 30-July 5; Kadiak, July 20; Popof Island, July 7-18.

Upon the return of the Expedition the collections were carefully labeled and the specimens assorted into groups, after which they were transmitted to Dr. L. O. Howard, Chief of the Division of Entomology of the U. S. Department of Agriculture, and Honorary Curator of Insects in the U. S. National Museum, for distribution to specialists for study and report.

As a result of these investigations there has been published in the Proceedings of the Washington Academy of Sciences a series of sixteen papers based upon the entomological material thus distributed. Two others are here published for the first time. The writer, as entomologist of the Expedition, wishes to thank the various authors for their promptness in reporting upon this material.

On bringing together the data derived from these several sources, it was found that the number of species included in the entire collection was approximately 1,000, of which 344 were considered by the specialists to whom they were intrusted to be new to science. Descriptions of these new forms will be found in the following pages. The list also includes over twenty species hitherto recorded only from Europe, thus adding to the growing list of insects known to exist upon both the American and European continents.

The number of previously described species, new species, and total number of species collected, arranged by orders, are here given.

Insecta.	Described Species.	New Species.	Total.
Apterygota	8	6	14
Neuropteroids.....	25	9	34
Odonata.....	8	0	8
Orthoptera.....	1	0	1
Hemiptera { Heteroptera	18	0	18
{ Homoptera.....	14	10	24
Coleoptera	154	1	155
Diptera.....	213	63	276
Lepidoptera.....	66	9	75
Hymenoptera.....	98	237	335
Myriapoda.....	6	3	9
Arachnida.....	46	6	52
Total.....	657	344	1,001

An effort was made to record, while in the field, such data as seemed worthy of preservation as a preliminary study of the biology of Alaska insects. It was hoped that some observations might be made bearing upon the adaptations of these forms of life to the peculiar climatic conditions of the coastal regions of Alaska. At Sitka, for instance, the annual precipitation attains the enormous total of 105 inches, and at Unalaska, in the Aleutian Islands, it is but little less. Another feature con-

stantly kept in mind was the relation between the insect fauna and the northern flora. Through the courtesy of the botanists of the Expedition, the writer has been furnished with identifications of the plants which he collected incidentally in connection with this work.

It is needless to say that the great length of the itinerary, together with the shortness of the stops possible at most of the stations, were hardly propitious for thorough observations along these lines. Such work can only be properly carried forward by resident naturalists with time at their disposal to follow the course of the seasons from one year to another. But such general facts as were observed are set down for the benefit of those who shall subsequently visit these regions and investigate more fully the natural history.

The conditions are so different in different parts of the Alaska coast that it seems desirable to summarize briefly, from the entomological standpoint, the special features of each stopping place, including the more important discoveries, and such observations upon the biology of the insects as time and circumstances permitted.

LOWE INLET, BRITISH COLUMBIA

June 3.—The first landing made by the Expedition was at this small settlement on the northern shores of British Columbia, where several hours were spent in making collections. The clearings about the village were thickly overgrown with a tangle of plants belonging to species common along the coasts of Washington and Vancouver Island, as the salmon-berry (*Rubus spectabilis*), wild currant (*Ribes bracteosum*), and elder-berry (*Sambucus racemosus*), all of which were in bloom. Several other familiar plants were also in evidence, as the yellow violet (*Viola glabella*) and the dwarf cornel (*Cornus canadensis*).

Insects were by no means abundant, but by dint of considerable sweeping a number of species were brought to light, principally Diptera, of which group 23 species were taken. About the flowers of the salmon-berry several Syrphidæ hovered, including *Sphegina infusata* Loew, *Baccha obscuricornis* Meig., *Platychirus peltatus* Meig., and *Melanostoma mellinum* (L.).

About the same flowers darted a swarm of Empidæ, comprising three species—*Rhamphomyia corvina* Loew, *Empis triangula* sp. nov. Coq., and *Microphorus flavipilosus* sp. nov. Coq. Another insect that was extremely common was *Bibio variabilis* Loew. In sweeping through the grass and low herbage several interesting Mycetophilidæ were captured, including *Diadocidia borealis* sp. nov. Coq. and *Sciara tridentata* Rübs., the latter originally described from Greenland. Two species of Tipulidæ were taken in the same manner; one of these, *Rhypholophis affinis* Lund., is recorded from Greenland, the other, *Tricypthona vitripennis* (Doane), from the State of Washington.

Very few beetles were in evidence. *Amphichroum testaceum* occurred in vast numbers at the flowers of the salmon-berry. *Hyphnoides musculus* Esch. was found beneath stones along the beach, while *Podabrus piniphilus* Esch. crawled about among the foliage.

Of Hymenoptera, the most conspicuous were the bumble-bees, of which several species were noticed visiting the salmon-berry. A single saw-fly, *Tenthredo ferrugineipes* Nort., was swept from a branch of elder-berry, while an Ichneumon caught among the grass was found by Mr. Ashmead to represent a new species, *Philonygus glacialis* Ashmead.

METLAKATLA, ALASKA

June 4.—A stop of half a day was made at this interesting missionary village, on Annette Island, at the extreme southeastern limit of Alaska territory. The vicinity of the settlement is rather favorable for the operations of the entomologist, since it is open and marshy, with scattered clumps of scrub pine (*Pinus contorta*) and occasional pools and small lakes. In the marshy ground were found in full bloom many of the most characteristic plants of southeastern Alaska, including *Pinguicula vulgaris*, *Coptis trifolia*, *Menyanthes trifoliata*, *Sieversia calthifolia*, *Drosera longifolia*, *Nephrophyllidium cristagalli*, *Empetrum nigrum*, *Rubus chamæmorus*, *Lysichiton kamtschatense*, *Habenaria hyperborea*, and *Dodecatheon viviparum*.

Amidst this array of blossoms Diptera were very numerous, and the net soon yielded over thirty species. At the flowers of

Menyanthes, the principal visitors were *Eristalis occidentalis* Will., *Neoascia globosa* L., and *Melanostoma mellinum* (L.). At *Nephrophyllidium* the only insect taken was *Melanostoma mellinum* (L.), while at *Sieversia* a number of Muscidæ were captured, as well as one species of Syrphidæ (*Melanostoma trichophus* Thomson). In the spathes of *Lysichiton*, a beetle (*Donacia femoralis* Kby.) was found at work devouring pollen, and here also occurred the fly, *Syrphus ribesii* L.

Sweeping brought to light a number of Diptera hidden in the grass and herbage, including five Tipulidæ, of which two were



FIG. 1. METLAKATLA.

new (*Tipula strigata* Coq. and *Tipula gelida* Coq.); three species of Empidæ, all of which were new (*Empis fumida* Coq., *Rhamphomyia glauca* Coq., and *Rhamphomyia anthracodes* Coq.); and two species of Dolichopodidæ, *Dolichopus longimanus* Loew being especially abundant. Of the Muscidæ, the most interesting were *Orthochaeta pilosa* (Zett.), a European species not previously known from America, and *Ædoparea glauca* Coq., a new species of Sciomyzidæ.

With the exception of water beetles, the Coleoptera do not thrive in very marshy places, only six species being found, and these of an uninteresting character, except *Stenus umbratilis* Casey, which was new to Alaska, although known from British Columbia. The same may be said of the Heteroptera, since

only one, *Gerris rufoscutellatus*, a widespread species, was observed.

Of the small number of Hymenoptera captured, the most interesting were two species of ants discovered in a decaying pine stump. They were representatives of two genera (*Leptothorax yankee kincaidi* Pergande and *Formica neorufibarbis* Emery), and, with the exception of one species, are the first members of this group to be recorded from Alaska. The *Formica* was subsequently found as far west as Kadiak.

Excepting a few bumble-bees (*Bombus juxtus* Cr.), no other representatives of this order were seen, aside from two species of saw-flies. One of these (*Tenthredo erythromera* Prov.) was already known from Vancouver Island, while the second was a new species of *Monophadnus* (*M. insularis* Kincaid).

Only two species of Lepidoptera were captured—moths of the families Geometridæ and Tortricidæ. *Rheumaptera hastata* L. was very common here, as well as at several localities subsequently visited. The second species has been described by Dr. Fernald as *Phoxopteris kincaidiana* sp. nov.

Eight spiders and two Myriapods complete the list of captures at this point. Both of the latter are of interest, one of them (*Parajulus alaskanus* Cook) being new to science, while the other, a little hairy Diplopod of the genus *Polyxenus* (*P. pugetensis* Kincaid), was originally described from the State of Washington.

FOX POINT

July 26-27.—This name is applied to an Indian village at the extreme southeastern corner of the Alaska mainland. It was once populous, but is now deserted. It was the last station touched at by the Expedition on the return journey.

Although the season was well advanced for this section of the country, some summer plants were still in bloom, more especially certain of the Umbelliferæ. At these plants 23 species of Diptera were captured, the most notable of which were Syrphidæ: *Pipiza pisticoideus* Will., *Syrphus velutinus* Will., *Sphærophoria sulphuripes* (Thomson), *Eristalis flavipes* Walk., *Eristalis obscuris* Loew, *Criorhina armillata* O. S.,

Criorhina scitula Will.; Tachinidæ, five species, including *Paraphyto borealis* sp. nov. Coq.

The bumble-bees collected were of four species — *B. oregonensis* Cr., *B. alaskensis* sp. nov. Ashm., *B. mixtuosus* sp. nov. Ashm., and *B. dimidiata* sp. nov. Ashm. The Sphegoidea were represented by *Clytochrysus gracilissimus* (Pack.) and *Mimesa propinqua* sp. nov. Kincaid, the Vespoidea by *Odynerus albophaleratus* Sauss. Three Ichneumonidæ found at the above



FIG. 2. INDIAN VILLAGE, FOX POINT

mentioned Umbelliferæ were determined by Mr. Ashmead as *Rhyssa alaskensis* sp. nov., *Enicospilus purgatus* (Say), and *Rhogas harrimani* sp. nov.

A few beetles were collected, but none of these were of special interest. The same may be said of the Heteroptera, of which only three species were secured. Homoptera were represented by a leaf-hopper, three species of *Aphalara*, and one of *Psylla*.

Several butterflies were netted as they fluttered along a path-way — the only examples seen of *Papilio machaon aliaska* Edw. and *Vanessa milberti* Godt.

FARRAGUT BAY

June 5. — A short stop was made at this point, but the conditions were unfavorable for collecting. Turning over some of the débris along the shore, eight species of Coleoptera were discovered. One of these proved to be a new species (*Nebria kincaidi* Schwarz), while another (*Telephorus divisus* Lec.)

was new to Alaska, although known to occur in British Columbia.

Four interesting Diptera were taken in the same situation with the above — *Didyma pullula* Van der Wulp, a Tachinid originally described from Mexico; *Chirosia glauca* Coq., a new species of Anthomyid; *Aptilotus politus* (Will.), a Borborid originally described from California; *Ædoparea glauca* Coq., a new form of the family Sciomyzidæ, specimens of which had already been taken at Metlakatla. In addition to these a Syrphid (*Sphegina infusata*) was captured at the flowers of a species of *Lupinus*. A single caddice-fly found beneath a stone proved to be *Asynarchus punctatissimus* (Walker), a widely distributed representative of the group.

JUNEAU

June 7 and July 25.—A short stay was made at Juneau on June 7, during the northward journey of the Expedition, but the conditions were not favorable for the collection of insects. On the return trip a day (July 25) was spent at this locality, and a better opportunity was afforded to study the entomological conditions of the region. At the rear of the town a good collecting ground was found about the shores of a small pond in a deep hollow. Here were growing dense patches of *Epilobium spicatum* and numerous other plants. Over thirty species of Diptera were captured, including ten species of Syrphidæ. Most of the latter had already been collected at other localities, the only exceptions being *Syrphus gracilis* sp. nov. Coquillett and *Xylota barbata* Loew. Other interesting Diptera were *Rhamphomyia setosa* Coq. and *Sepsis flavimana* Meigen, the latter a European species not previously known from the American continent. Bumble-bees were quite common on the blossoms of *Epilobium spicatum*, including *Bombus nearcticus* Handl., *B. melanopygus* Nyl., *B. oregonensis* Cr., and *Psithyrus insularis* (Smith). Ichneumonoidea were also abundant among the herbage, and yielded ten species, of which eight were new to science, including a new genus (*Hyposyntactus* Ashmead). Dragon-flies were common about the edge of the pond, but all were of a single species, *Enallagma calverti* Morse.

The list of insects taken at Juneau is completed by a few beetles, two moths, a single true-bug, a Neuropteroid insect (*Chloroperla pacifica* Banks), and six species of Arachnida.

On crossing to Douglas City, on the opposite side of the channel from Juneau, a few additional captures were made, mainly at the blossoms of *Achillea millefolium*.

MUIR INLET, GLACIER BAY

June 9-12. — For four days the members of the Expedition explored the shores of Glacier Bay in the vicinity of the Muir Glacier. On the 9th the writer formed one of a party to visit a small island in the bay just opposite the face of the glacier. It was found to consist mainly of glacial débris, and was thickly overgrown with shrubs and flowering plants, including *Sedum roseum*, *Fragaria chiloensis*, *Astragalus alpinus*, *Dryas octopetala*, *Chamaenerion latifolium*, a species of *Taraxacum*, and several species of *Salix*.

The stones along the shore of this little island concealed numerous beetles, mostly Carabidæ, which scampered away when their hiding places were disturbed. Among the captures made in this way were *Nebria mannerheimi* Fisch., *Nebria metallica* Fisch., *Pterostichus riparius* Dej., *Pterostichus luzoti* Dej., *Bembidium complanatum* Mann., *Bembidium bimaculatum* Kby., *Amara remotestriata* Dej., and *Calathus ingratus* Dej.

On the following day a party was conveyed in a naphtha launch to a point on the shore of the bay several miles from the foot of the glacier. Here a favorable collecting ground was selected and the day was spent in exploring the neighborhood. The soil of the entire region was evidently of recent glacial origin, and in the gravelly débris a growth of coniferous trees was attempting to establish itself. Dense thickets of alder and willow made traveling somewhat difficult. Among the more conspicuous plants in bloom were *Caltha palustris*, *Anemone multifida*, *Anemone parviflora*, *Dodecatheon pauciflorum*, *Aquilegia formosa*, *Ranunculus occidentalis*, *Silene acaulis*, *Arabis ambigua*, *Petasites frigida*, and *Primula egalikensis*.

The plant whose blossoms seemed to attract the greatest number of insects was *Caltha palustris*. The visitors were

mostly Diptera, and among them were the following—Syrphidæ: *Melanostoma mellinum* (L.), *Syrphus contumax* O. S., *Syrphus glacialis* (Johnson), *Helophilus dychei* Will., and *Eristalis tenax*; Empidæ: *Rhamphomyia setosa* Coq., *Hilara transfuga* Walk.; Scatophagidæ: *Scatophaga islandica* Becker, *Cordylura vittipes* Loew, *Cordylura præusta* Loew; Phoridæ: *Trineura aterrima* (Fabr.); Anthomyidæ: *Hyetodesia brunneinervis* (Stein), *Homalomyia flavivaria* sp. nov. Coq., and *Phorbia biciliata* sp. nov. Coq. Resting upon the under surfaces of the leaves of the same plant, but never appearing on the flowers, were vast numbers of a species of Psychodidæ, *Pericoma bipunctata* Kin., originally described from Washington and California.

The willows also were well supplied with visitors, among which may be mentioned the following—Mycetophilidæ: *Boletina grænlandica* Staeger; Bibionidæ: *Bibio variabilis* Loew, *Dilophus serraticollis* Walk.; Syrphidæ: *Syrphus glacialis* (Johnson), *Melanostoma mellinum* (L.); Empidæ: *Rhamphomyia albopilosa* sp. nov. Coq. In sweeping among the herbage three species of Tipulidæ were netted—*Tricyphona diaphana* Doane, *Dicranota argentea* Doane, and *Tipula tenebrosa* sp. nov. Coq.

Resting among the foliage of the willow bushes were several saw-flies, including *Dolerus sericeus* Say and *Tenthredo vari-picta* Nort., while at the blossoms of the same plant occurred the bumble-bees *Bombus melanopygus* Nyl. and *Psithyrus insularis* (Smith).

On the afternoon of June 10 an effort was made to climb one of the high hills to the left of the glacier, where the steep slope rises to the height of about two thousand feet. For some distance the hillside was dotted with clumps of alders and dwarf willows. At the blossoms of the latter bumble-bees were common, and here also was taken a single male specimen of *Andrena frigida* Smith, noteworthy as the first of the solitary bees to be discovered in Alaska. On the same slope were found the first butterflies of the Expedition, *Pieris napi bryoniæ* Ochs., as well as two moths, *Petrophora borealis* Hulst and *Phoxopterus kincaidiana* sp. nov. Fernald.

The last day was spent in exploring the district at the western side of the glacier. Among the morainic material left behind by the ice in its retreat, numerous plants soon take root, among the very first being the willow-herb (*Chamanerion latifolium*), the brilliant blossoms of which brighten the shattered rocks. The only insects captured at the flowers of this species were the Syrphid *Platychirus aeratus* Coq., and, more abundantly, *Limnophora nobilis* Zett. and *Spania edeta* Walker, the latter one of the few representatives of the Xylophagidæ found in Alaska. Many minute Ichneumonidæ also were taken in the sweep net, and several of these were subsequently found to be new.

Above the western edge of the glacier, on a ledge of glacial débris, several small ponds were discovered in which a large number of aquatic Coleoptera and Hemiptera disported themselves. Of the latter there were two species, *Corisa convexa* Fieber and *Corisa præusta* Fieber. The beetles were of three species, *Deronectes griseostriatus* DeG., *Hydroporus signatus* Dej., and *Agabus tristis* Aubé. Of the last-mentioned species numerous larvæ were also secured beneath the débris along the shore. In the same pond were numbers of caddice-fly larvæ, but only one adult insect was taken. It has been described by Mr. Banks as *Asynarchus fumosus* sp. nov.

Apterygota were quite common under the stones upon the moraines. Four species were taken, three of which were new to science, *Entomobrya kincaidi* Folsom, *Papirius palmatus* Folsom, and *Machilis arctica* Folsom. The Arachnida were well represented at this point, since fifteen species, including three new forms, were collected without any special effort. Myriapoda were not common, the only species found being *Conotyla atrolineata* (Bollman).

SITKA

June 14-17.—The neighborhood of Sitka has been perhaps more carefully investigated than any other section of Alaska. Here the Russian naturalists made their most important collections, and those who have followed in their footsteps have usually made Sitka their rendezvous. And with very good

reason, for there is no doubt that the characteristic flora and fauna of the coastal region of southeastern Alaska here attain their most perfect development.

After traversing the vast stretch of rocky, and in the main inhospitable, coast line between Vancouver Island and Sitka, it is with a sense of deepest pleasure that the naturalist sets foot within the noble forests of Sitka spruce and follows the winding pathways that traverse the great natural park on the banks of Indian River. For three days the members of the Expedition



FIG. 3. ISLANDS NEAR SITKA.

had the privilege of delving in this primeval forest in search of biological treasures. To one accustomed to the forests of western Washington, the scenery seemed strangely familiar. The conifers were indeed of different species, but of the same general character, while the underwood was composed of shrubs and flowering plants identical in many cases with those found farther south. There were tangled thickets of salmon-berry (*Rubus spectabilis*) and elder-berry (*Sambucus*), with here and there clumps of the inhospitable devil's club (*Panax horridum*). Gloomy spots were lighted up by the broad green leaves and yellow spathes of the skunk cabbage (*Lysichiton*). At the river's edge grew dense growths of willow and wild currant (*Ribes bracteosum*). Among the less conspicuous vegetation many familiar plants greet the sojourner from the south, for example, the spring-beauty (*Claytonia sibirica*), mitrewort

(*Tiarella trifoliata*), yellow violet (*Viola glabella*), and *Osmorrhiza nuda*.

Undoubtedly, of all the plants in bloom at this season the greatest favorite with flower-visiting insects was the salmon-berry. Its long period of blooming, its widely opened blossoms, and its abundant, easily accessible nectar, render it an attractive rendezvous for insects. The pendant form of the flowers is also important, as the flaring corolla sheds the rain, and in this way not only protects the nectaries, but also provides a shelter for visiting insects during the frequent showers.



FIG. 4. FOREST NEAR SITKA.

In the short time at our disposal it was of course impossible to do more than make a hasty collection of the more conspicuous insects, but the results show what a rich harvest awaits more thorough investigation. More than 200 species were collected, of which 34 were new to science, several new to America, and many represented additions to the fauna of Alaska.

As usual, the Diptera form the predominant feature of the insect fauna, not only in species, but also in abundance of individuals. At hours when the sun shone the air fairly swarm-

ed with Diptera and other flying insects. The most abundant flies were *Bibio variabilis* and *Dilophus serraticollis*, the latter occurring in countless numbers in the blossoms of the salmon-berry. The same flower furnished a harboring place for numbers of Syrphidæ, of which nine species were secured: *Chilosia plutonia* Hunter, *Melanostoma mellinum* (L.), *Platychirus peltatus* (Meigen), *Platychirus albimanus* Fabr., *Syrphus diversipes* Macq., *Syrphus amalopsis* O. S., *Baccha obscuricornis* Loew., *Sphegina infuscata* Loew., *Brachyopa notata* O. S., *Sericomyia*

chalcopyga Loew., *Criorhina tricolor* sp. nov. Coq., and *Eristalis occidentalis* Will. Of these the most abundant were *Chilosia plutonia* and *Sphegina infuscata*. *Platychirus albimanus* is a European species and an addition to the American fauna.

Perhaps the most striking feature of the dipterous fauna at this point was a large number of species and individuals of the family Empidæ. No less than fifteen species were swept from the bushes bordering the pathways. This series includes representatives of six genera (*Empis*, *Gloma*, *Microphorus*, *Rhaphomyia*, *Ocydromia*, and *Platypalpus*), and of the species ten were new to science. The most abundant species were *Empis virgata* Coq. and *Empis triangula* sp. nov. Cov.

Among other interesting Diptera taken at this place may be mentioned the Chironomid named by Mr. Coquillett *Chasmatonotus univittatus* sp. nov., *Sciara expolita* sp. nov. Coq., *Beris annulifera* Bigot (the only representative of the Stratiomyidæ seen upon the Expedition), eleven species of Anthomyidæ, including two previously undescribed, and two species of Lonchæidæ (*Lonchæa albitarsis* Zett. and *L. deutchi* Zett.), both additions to the American fauna.

No special effort was made to collect Coleoptera, since this order has been thoroughly collected by the Russians and others, but over 50 species were taken, including several new to the fauna of Alaska, namely, *Agyrtes longulus* Lec., *Sericosomus incongruus* Lec., and *Eros latus* Mots.

With the exception of the common white *Pieris* no butterflies were taken at Sitka, but 17 species of moths appear in the collection. Most of them belong to the families Noctuidæ and Geometridæ. The latter family included one new form, *Tephroclistis flebilis* sp. nov. Hulst.

It is evident that the extreme humidity of this and other sections of Alaska is not favorable to the higher Hymenoptera. No fossorial Hymenoptera were found at Sitka, but a wasp (*Vespa borealis* Kirby) was taken at the blossom of *Menziesia ferruginea*. Diligent search among the fallen timber revealed three colonies of ants belonging to the species *Formica neorufibarbis* Em., *Lasius niger sitkensis* Pergande, and *Myrmica sulcinodoides* Em.

The Apoidea were represented almost exclusively by members of the genus *Bombus* (*B. californicus* Smith and *B. alaskensis* sp. nov. Ashmead). These, together with *Psithyrus insularis* (Smith), occurred at the blossoms of the salmon-berry. A solitary female specimen of *Andrena frigida* Smith was swept from the catkin of a willow, and thus furnished a companion in the collection for the male of the same species taken a few days previously at the Muir Glacier.

Of the Ichneumonoidea, a rather small series was secured, comprising only 17 species; but of these only five were previously known, the remaining twelve having been described as new by Mr. Ashmead. One of them was made the type of a new genus (*Dallatorrea*).

The Tenthredinoidea seem to thrive in these northern regions better than their higher relatives, since sixteen species were obtained by sweeping among the shrubbery. The family Lydidæ was represented by three species—*Itycorsia marginiventris* Cr., *Cephaleia nigropectus* Cr., and *Bactroceros sitkensis* sp. nov. Kincaid; the Selandriidæ by *Erythraspides ashmeadii* sp. nov. Kincaid and *Pæcilostomidea maculata* Nort.; the Nematidæ by *Pachynematus ocreatus* Hgtn., *Pristiphora lena* sp. nov., and *Pteronus rivularis* sp. nov. Kincaid; the Tenthredinidæ by *Dolerus sericeus* Say and seven species of *Tenthredo*: *T. ferrugineipes* Cr., *T. varipicta* Nort., *T. evansii* Hgtn., *T. lineata* Prov., *T. nigricollis* Kby., *T. erythromera* Prov., and *T. melanosoma* Hgtn. These large and beautiful saw-flies form a most conspicuous feature of the insect fauna.

Of the Neuropteroids eight species were encountered, mostly forms known to exist in other regions of America, the only exception being a caddice-fly described by Mr. Banks as *Limnephilus harrimani*.

The Hemiptera, as was the case at most points, were poorly represented. Of Heteroptera only three were seen—*Irbisia sericans* Stål., *Scolopostethus thompsoni* Reuter, and *Corisa præusta* Fieber. The Homoptera were more numerous, seven species of leaf-hoppers comprising the list, but all of these were previously known from other sections of America.

Of Apterygota, Mr. Folsom found six species in the collection made at Sitka, three of which were new to science.

Ten species of Arachnida, including two new forms, and two Chilopods (*Parajulus alaskanus* sp. nov. Cook and *Geophilus alaskanus* sp. nov. Cook) complete the list of Sitka Arthropods.

YAKUTAT

June 18-22. — On June 18 a party landed at the village of Yakutat, and for three days a camp was established upon a sand spit close to the settlement. Although the weather was showery, a diligent effort was made to secure as large a series of insects as the time would permit.

The region about Yakutat Bay is densely timbered, and back from the coast rugged hills rise almost from the water's edge



FIG. 5. YAKUTAT.

and make the interior almost impassable. It was soon discovered that very few living things were to be found in this gloomy forest. Most of the life was confined to the narrow zone between high-tide and the edge of the timber, where rich banks of vegetation were spread out in the sunlit spaces. The principal element in these thickets was the ubiquitous salmon-berry, with here and there patches of devil's club, huckleberry, and wild currant. At intervals the rugged shore gave way to stretches of level sandy ground upon which numerous flowering plants found an opportunity for development, the most notable being the strawberry (*Fragaria chiloensis*), tufts of lupine, the

wild pea-vine (*Lathyrus maritimus*), with isolated clumps of alder and willow. Occasional marshy spots and small ponds supported a different vegetation, including *Habenaria*, *Nephrophyllidium cristagalli*, *Caltha palustris*, and other aquatic plants.

Immediately in front of the village a small island stands out in the bay. Upon this our party found an extensive patch of strawberry plants in full bloom. Here also occurred several tufts of *Heracleum lanatum* with the umbels partially opened. This plant is a great favorite with flower-visiting insects, but was not yet sufficiently advanced to welcome any guests.

The insect fauna of Yakutat is evidently very closely related to that of Sitka, but not so rich, since the environment is not so diversified. In all 164 species of insects were taken, of which 37 were new to science, but many of these had been already collected at Sitka.

As usual the Diptera predominated in the collections, the list in this group comprising 63 species. The Syrphidæ were very abundant. Of the eleven species secured here six had already been collected at Sitka, while five appeared here for the first time—*Chilosia borealis* sp. nov. Coquillett, *Chilosia alaskensis* Hunter, *Chilosia lasiophthalma* Will., *Syrphus glacialis* (Johnson), and *Syrphus macularis* (Zett.). This latter species, according to Mr. Coquillett, is a European form not hitherto known from America.

Most of the Syrphidæ were taken at the flowers of the strawberry, including *Chilosia alaskensis* Hunter, *Chilosia lasiophthalma* Will., *Chilosia borealis* sp. nov., *Syrphus amalopis* O. S., *Syrphus glacialis* (Johnson), *Sphegina infuscata* Loew, and *Brachyopa notata* O. S. The remaining species were swept from the blossoms of the salmon-berry, comprising *Syrphus diversipes* Macq., *Syrphus macularis* (Zett.), *Melanostoma mellinum* (L.), and *Chilosia plutonia* Hunter.

The family Empidæ was represented by eleven species, of which the most common was *Empis virgata* Coq. Eight of these had already been observed at Sitka, but three were unfamiliar—*Empis clauda* sp. nov. Coquillett, *Gloma obscura* Loew, and *Rhamphomyia disparilis* sp. nov. Coq.

The Dolichopodidæ included *Dolichopus plumipes* (Scop.), previously taken at Sitka, and *Porphyrops consobrinus* Zett., a European form not previously recorded from the American continent.

Other interesting Diptera were: *Telmatogeton alaskensis* sp. nov. Coquillett, a strange Chironomid representing a genus not previously known to exist in America; seven species of Tipulidæ, including *Tipula cineracea* sp. nov. Coquillett; *Boletina inops* sp. nov. Coq., one of the Mycetophilidæ; *Phytomyza flavicornis* Fallen, a European species of Agromyzidæ not previously known from America.

The Coleoptera were not abundant, but, by dint of tearing off loose bark and turning over fallen timber, 43 species, mostly Staphylinidæ, were gathered. None of these proved to be of special interest, but several were found to be new to the fauna of Alaska, including *Stenus insularis* Casey, *Orobatus simulator* Lec., and *Ditylus quadricollis* Lec.

No butterflies were observed at Yakutat, and very few moths appear in the collection.

Only one representative of the Apoidea appeared—*Bombus mixtuosus* sp. nov. Ashmead. Tenthredinidæ were comparatively rare. Five species of *Tenthredo* were secured, but all had been previously found at Sitka, namely, *T. varipicta* Nort., *T. evansii* Hgtn., *T. flavomarginis* Nort., *T. erythromera* Prov., and *T. melanosoma* Hgtn. Two new Nematids were taken in the sweep net—*Pachynematus oronus* Kincaid and *Pteronus zebratus* Kincaid. The parasitic Hymenoptera comprised eighteen species of Ichneumonoidea, of which Mr. Ashmead has described seventeen as new.

The Neuropteroids yielded five species, of which three proved new. Spiders were not common, only twelve species appearing in the collection, but of these two have been described as new by Mr. Banks.

VIRGIN BAY, PRINCE WILLIAM SOUND

June 25-26.—A stop of a little over twenty-four hours at this point was hardly long enough to make extensive collections, hence the list from Virgin Bay includes only 78 species, of which the majority are Diptera.

The region in which our camp was pitched was extremely boggy, with high mountains rising on every hand. The vegetation was varied, and there is little doubt that the locality supports an extensive insect fauna.

The party was landed at a late hour in the afternoon, but as Prince William Sound is near the "land of the midnight sun," the writer started out with ambitious strides to climb one of the great rocky hills which rose from near sea level to an altitude of about three thousand feet. The first part of the route lay through a marsh brilliant with many-colored blossoms, including *Iris setosa*, *Habenaria hyperborea*, *Menyanthes trifoliata*, *Nephrophyllidium cristagalli*, *Pinguicula villosa*, and *Pedicularis versicolor*. The banks of a small stream were set with thickets of *Rubus spectabilis* and *Panax horridum*. The lower slopes of the hillside were very steep and thickly clothed with dense coniferous forest. Here and there a grassy open space glittered with the yellow flowers of *Sieversia calthifolia*. On climbing above the forest the hill became much rougher and a different series of plants were encountered, the most striking being *Anemone narcissiflora*, *Arcteranthis cooleyæ*, and *Orchis aristata*. Still higher upon the rocky summit occurred the characteristic plants of high altitudes—tiny primroses, delicate Ericaceæ, and diminutive Saxifragaceæ, while near by were great snow banks filling the depressions where the sun's rays fell with diminished force. In struggling through these drifts several dead or benumbed insects were picked up from the ice. They had evidently been blown by the wind from warmer regions and had been chilled by sudden contact with the frigid air of the snow fields. At the very apex of the hill was a small pond in which were many tiny water-beetles (*Hydroporus tristis* Payk.), while about the margin fluttered pretty caddice-flies, determined by Mr. Banks as *Limnephilus nebulosus* Kirby. Several moths were also taken at this altitude, including *Titacis hyperborea* sp. nov. Hulst. From the mountain top a magnificent view was had of the surrounding country, notwithstanding the fact that midnight was close at hand.

The flowers of *Sieversia* seemed to attract numerous Diptera, especially Syrphidæ, and by sweeping among the patches of

this plant the following representatives of the family were secured: *Chilosia occidentalis* Will., *Chilosia plutonia* Hunter, *Melanostoma mellinum* (L.), *Syrphus amalopis* O. S., *Syrphus mentalis* Will., *Syrphus diversipes* Macq., *Neoascia globosa* Walk., and *Brachyopa notata* O. S. Several Syrphids were also taken at the flowers of *Nephrophyllidium cristagalli* — *Myiolepta bella* Will. and *Eristalis occidentalis* Will.

Of the 47 species of Diptera captured at Virgin Bay all but 14 had been previously encountered at more southern stations, but among the unfamiliar forms Mr. Coquillett found several of considerable interest, including *Ornithodes harrimani*, a Tipulid for which he found it necessary to erect a new genus; *Cylindrotoma juncta* sp. nov. Coq.; *Empis pellucida* sp. nov. Coq., and *Rhamphomyia macrura* sp. nov. Coq., new types of Empidæ; and *Ceratopogon hirtulus* sp. nov. Coq., an addition to the family Chironomidæ.

Of Coleoptera very few were collected, and the Hemiptera are represented by a single Capsid.

Among the Hymenoptera may be mentioned *Bombus mixtuosus* sp. nov. Ashmead, here seen for the first time, but collected later at stations farther west. The specimens were taken at the flowers of *Rubus spectabilis*. Upon a promontory jutting out into the bay was a considerable patch of *Menziesia ferruginea*, among whose bell-like blossoms *Vespa borealis* Kirby was found busily extracting nectar. Of saw-flies the collection yielded six species, but none of these were of special interest. Several parasitic Hymenoptera were collected, including *Ichneumon kincaidii* sp. nov. Ashmead and *Zelotypa alaskensis* sp. nov. Ashmead, the latter one of the Proctotrypidæ.

At this locality Odonata were first noticed in considerable numbers. Two species were on the wing, but of these only one was captured — *Leucorhinia hudsonica* (Selys.).

ORCA, PRINCE WILLIAM SOUND

June 24-25 and 27-28. — Short stops, mainly at night, were made at this point, where an extensive salmon cannery has been erected. The district is so mountainous and inaccessible that very few insects were taken.

Several of the species, however, do not appear in the collections made at other localities, namely, *Rhypholophus flaveolus* sp. nov. Coq., one of the Tipulidæ; *Leria fraterna* (Loew), one of the Helomyzidæ originally described from Alaska; and three new species of Ichneumonidæ.

SELDOVIA, KENAI PENINSULA

July 21.—On July 21 a small party, including the entomologist, was landed at this settlement with the expectation that an opportunity would be afforded to explore the neighborhood for several days, but circumstances arose rendering it necessary to embark on the steamer the following day. It is a matter for regret that a more adequate opportunity was not offered for making collections at this locality, which promised to yield as rich a series of insects as any visited by the Expedition.

The Kenai Peninsula is very rugged and in part heavily timbered, but the variety of flowering plants in bloom was surprising. Within a radius of one hundred yards from our camp the writer collected over thirty species of plants in various stages of bloom, including *Epilobium spicatum*, *Rosa* sp., *Heracleum lanatum*, *Comarum palustre*, *Nuphar*, *Spiræa*, *Pedicularis*, *Achillea millifolium*, *Ligusticum*, *Pyrola*, *Vicia*, *Lathyrus*, *Amelanchier*, *Galium*, *Potentilla*, *Aquilegia*, *Sanguisorba*, and *Oxytropis*.

The collection of insects comprised 115 species, but the majority of these had already been seen at other points, either to the southward, at Yakutat and Sitka, or to the westward, at Kukak, Popof Island, and Kadiak. The principal novelties occurred in the Diptera, including *Tipula macrolabis* Loew, originally described from Hudson Bay; *Chilosia pulchripes* Loew, a European Syrphid new to the American fauna and obtained also at Kukak; *Chilosia tristis* Loew; *Leucozona leucorum* (L.), also taken at Popof Island; *Empis brachysoma* sp. nov. Coq.; *Sepsis flavimana* Meigen, a European species not previously reported from America; *Scatella setosa* sp. nov. Coq.; and *Agromyza lacteipennis* Fallen, another addition of European insects to American lists.

The collection of Coleoptera comprised twenty-two species,

including several interesting beetles, such as the beautiful *Pachyta liturata* Kirby and *Anaspis rufa* Say, both of which were taken at the flowers of *Ligusticum scoticum*.

Of Hymenoptera, as usual, the most conspicuous representatives were the bumble-bees, of which no less than five species were taken from the flowers of *Epilobium spicatum*, including *Bombus couperi* Cr., *B. oregonensis* Cr., *B. polaris* Curtis, *B. sylvicola* Kby., and *Psithyrus insularis* (Smith). None of the other families of bees were represented, so far as discovered, but of the Sphegoidea two examples came to hand, *Ectemnius parvulus* (Pack.) and *Blepharipus ater* (Cr.), both of which occur upon the flowers of *Achillea*.

The only saw-flies collected belong to the genus *Tenthredo*, of which seven species were taken—*T. ferrugineipes* Cr., *T. varipicta* Nort., *T. evansii* Hgtn., *T. flavomarginis* Nort., *T. nigricollis* Kirby, *T. erythromera* Prov., and *T. melanosoma* Hgtn. The Kenai Peninsula would seem to be almost the western limit of some of these species of *Tenthredo*, since very few were found at Kukak, to the westward.

Of parasitic Hymenoptera, the collection includes only nine species, of which Mr. Ashmead has described eight as new.

Two butterflies and two moths compose the list of Lepidoptera. One of the butterflies was the common *Pieris*, the other was *Chrysophanus dorcas* Kirby and occurred in great numbers at the flowers of *Comarum palustre*.

The series of Hemiptera taken at Seldovia was unexpectedly large. Of Heteroptera six species were collected—*Megalocera ruficornis* Fallen, *Mecomma gilvipes* Stål, *Lygus pratensis* L., *Nysius grönlandicus* Zett., *Nabis flavomarginis sibericus* Reuter, and *Aradus* sp. Of Homoptera, four species were taken in the sweep net—*Deltocephalus harrimani* sp. nov. Ashmead, *Cicadula sexnotata* (Fallen), *Cicadula fasciifrons* (Stål), and *Psylla alaskensis* sp. nov. Ashmead.

Dragon-flies were quite common along the margin of a small lake near camp, but seemed to be all of the single species *Enallagma calverti* Morse.

Very little attention was paid to the collection of spiders, on account of lack of time, but the group seemed to be well rep-

resented. Eight species were reported by Mr. Banks in the material brought from this point. To the writer the most interesting Arachnid collected on the Expedition was secured here. This was a pseudoscorpion found living in great numbers beneath stones covered by flood tide. These curious creatures seemed to be perfectly at home in this unusual habitat, and in many cases the lower surfaces of the stones were covered with silken bags full of their eggs or young.

KUKAK BAY

June 30-July 5. — Kukak Bay is a small indentation in the coast line of the mainland of the Alaska Peninsula north of Kadiak Island. Late in the night of June 30 the steamer bearing the Harriman Alaska Expedition entered this bay and put off an exploring party of which the writer was a member. Since the waters in this region are dangerous for navigation, the ship could not approach very near the coast, so the landing was effected in one of the metallic life-boats of the vessel. For some time it was found difficult to land, owing to the partial darkness and the rocky character of the shore, which bristled with jagged volcanic fragments, but at break of day a suitable spot was observed whereon a landing was accomplished, and the party disembarked. On clambering up the shore the writer was astonished at the beauty of the region. The coniferous forest which had up to this time formed such a conspicuous feature of the landscape was entirely absent, the only trees in sight being a few groups of cottonwoods, while upon the hills in the background clumps of dwarf alders (*Alnus sinuata*) stood out as dark green patches. We were evidently in the transition between the forested area of Alaska and the great treeless region which stretches westward over the Aleutian Islands. It was subsequently discovered by our party that groups of spruce trees occur at some distance in the interior.

No settlement exists at Kukak, the only evidence of human habitation being an abandoned log cabin, in which we took up our quarters. As soon as some refreshment was had, the party separated, in order to explore this interesting region. From an entomological standpoint it represented a new environment,

compared with the regions to the eastward, and the collection of the insect fauna was undertaken with the greatest enthusiasm.

While trees were absent, the vegetation was extremely varied. The area about camp was a veritable garden of brilliant blossoms, suggesting subtropical luxuriance, rather than the subarctic zone. Most beautiful of all were the orchids (*Orchis aristata* and *Cypripedium guttatum*), which grew everywhere in the greatest profusion. The purple flowers of *Geranium erianthum* and *Polemonium cæruleum* were in evidence on all sides, while in spots the air was rendered odorous by extensive patches of *Viola langsdorffii*. Among the other plants were *Lupinus nootkatensis*, *Mimulus langsdorffii*, *Fritillaria kamtschatensis*, *Habenaria dilatata*, *Campanula langsdorffiana*, *Pedicularis capitata*, *Heuchera glabra*, *Galium boreale*, and *Heracleum lanatum*. The latter exercises a most profound attraction for insects of many kinds. As a rule the umbels were found crowded with Diptera of numerous species, saw-flies (*Tenthredo*), beetles (*Leptalia*), parasitic Hymenoptera and moths.

The most marked feature of the insect fauna was not so much the number of species — of which 175 were secured — but rather the vast number of individuals. The writer has never witnessed a more active scene of insect life.

Surprising as it may seem, especially in comparison with previous localities, the Lepidoptera formed the most conspicuous feature of the insect fauna. The air was vibrant with the fluttering wings of butterflies, of which seven species were quickly captured, including *Parnassius smintheus* D. & H., *Brenthis myrina* Cram., *Cænonympha kodiak* Edw., *Eurymus palæno* L., *Pieris napi hulda* Edw., *Pieris napi academica* Edw., and *Pamphila palæmon* Pall. The most abundant of all was *Brenthis myrina*, which hovered about in thousands, the blossoms of *Geranium* attracting them in large numbers. *Cænonympha* was also very common, while *Parnassius* was abundant only on the hill tops. *Pamphila* was quite rare.

Moths also were common. Noctuidæ of five species were found upon the umbels of *Heracleum lanatum*, including *Hadena tenera* sp. nov. Smith, and *Anarta etacta* sp. nov. Smith. Of Geometridæ five species were taken, *Rheumaptera*

lugubris Staud. being the most abundant. Several specimens of this moth were captured with the pollinia of *Habenaria* clinging to their heads. The remaining moths were three Pyralidæ, two Tortricidæ, and a representative of the Sesiidæ, *Sesia culiciformis* L.

The collection of Hymenoptera contained an interesting series. There were three species of bumble-bees — *Bombus frigidus* Smith, *B. sitkensis* Nyl., and *B. juxtus* Cr. The Vespoidea were better represented than at any other locality visited by the Expedition, examples of three families being taken, as follows — Pompilidæ: *Arachnophila septentrionalis* sp. nov. Kincaid (at umbels of *Heracleum*); Vespidæ: *Vespa marginata* Kirby; Eumenidæ: *Odynerus albophaleratus* Sauss. (also at flowers of *Heracleum*). The Sphecoidea were represented by a Crabronid, *Thyreopus vicinus* (Cr.), taken at the same blossoms.

The Tenthredinoidea included seventeen species, of which two-thirds were new. The list comprises representatives of the genera *Fenusa*; *Paraselandria*; *Pachynematus* (two species); *Pristiphora* (three species); *Pontania* (two species); *Dolerus*; *Emphytus*; *Trichiosoma* (*T. triangulum*); and *Tenthredo* (five species — *T. ferrugineipes* Cr., *T. varipicta* Nort., *T. nigricollis* Kirby, *T. erythromera* Prov., and *T. dissimulans* sp. nov. Kincaid).

The list of parasitic Hymenoptera as determined by Mr. Ashmead comprises 21 species, of which 15 were new, including a new genus (*Harrimaniella*).

Of Diptera 68 species were captured. As usual the Empidæ and Syrphidæ were well represented, the former by 9, the latter by 14 species. In these families the more interesting captures were *Empis poplitea* sp. nov. Coq., *Hilara aurata* sp. nov. Coq., *Hilara quadrivittata* Meigen (a European species not previously recorded from America), *Chilosia pulchripes* Loew, *Platychirus tenebrosus* sp. nov. Coq., *Syrphus torvus* O. S., *Syrphus geniculata* Macq., and *Volucella facialis* Will.

Perhaps the most striking feature in the Diptera collected at this point was the surprising number of Dolichopodidæ, nine species in all, including two not found at any of the other stations — *Dolichopus lobatus* Loew and *Porphyrops consobrinus*

Zett., the latter a species new to American lists. Other interesting Diptera were *Chrysops nigripes* Zett., *Tabanus septentrionalis* Loew, *Thereva melanoneura* Loew, the only representative of this family in the entire collection, and *Scatophaga frigida* sp. nov. Coq.

Coleoptera were quite rare, except *Leptalia macilenta* Mann., which occurred in vast numbers on the umbels of *Heracleum*. Two weevils were collected which proved to be new to the Alaska fauna—*Orchestes rufipes* Lec. and *Sitones tibialis* Hbst.

Odonata were common about the ponds. Three species were taken—*Enallagma calverti* Morse, *Cordulia shurtleffi* Scudder, and *Leucorhinia hudsonica* (Selys.).

At Kukak Bay was captured the only grasshopper or member of the Orthoptera observed on the Expedition. Numerous individuals in various stages of growth were found along the borders of a marshy pool. Mr. Caudell has determined the species as *Melanoplus borealis* Fieber. It was already recorded from Alaska.

KADIAK

July 20.—A brief stop at the village of Kadiak, on Kadiak Island, on the return voyage, July 20,¹ enabled the writer to make a hasty collection, from which it is evident that this great island supports an extensive insect fauna. The presence of scattered bits of forest must add greatly to the possibilities for the development of insect life, giving the region an advantage over the treeless country to the westward; while the absence of continuous forests relieves the insect fauna from the limitations imposed by vast tracts of shade-producing conifers.

The list of insects from Kadiak comprises 125 species which, almost without exception, had already been procured at other stations. Among the Diptera the only unfamiliar types were a Tipulid, *Pedicia obtusata* O. S., an Empid, *Microphorus atratus* sp. nov. Coq., and a Syrphid, *Helophilus lunulatus* Meigen. None of the Coleoptera call for special mention. Butterflies were abundant, but of the same species as had been collected at Kukak Bay, with the exception of *Eneis semidea nigra*

¹During the main stop at Kadiak, July 1-5, Mr. Kincaid was with the Alaska Peninsula party at Kukak Bay.—Ed.

Edw., which was new to the collection. Of the moths the most conspicuous were the two Arctiidæ, *Platartia parthenos* Harr. and *Nemeophila plantaginis* L. A species of *Plusia* taken here has been described by Dr. Ottolengui as *P. epsilon* sp. nov., while a Sesiid in the collection, of which a solitary specimen was taken at this station, was described as new by Mr. Beutenmüller under the name *Sesia arctica* sp. nov.

The Apoidea included four species of *Bombus* (*B. moderatus* Cr., *B. oregonensis* Cr., *B. polaris* Curtis, *B. pleuralis* Nyl.) and a new form of *Psithyrus* (*P. kadiakensis* sp. nov. Ashmead). The saw-flies comprised *Dolerus sericeus*, three species of *Tenthredo* (*T. ferrugineipes* Cr., *T. varipes* Nort., and *T. evansii* Hgtn.), *Trichiosoma triangulum aleutiana* Cr., and *Cimbex americana* Leach. A colony of ants (*Formica neorufibarbis* Em.) was found here in searching for beetles under a decayed cottonwood log.

Odonata were observed in great numbers about a small lake at the rear of the village. Four species were taken, which have been determined by Mr. Currie as *Enallagma calverti* Morse, *Æschna juncea* (L.), *Æschna constricta* (Say), and *Soma-tochlora albicincta* (Burm.).

Spiders were very abundant, more species being collected here in an hour than were secured at Popof Island in ten days. It was rather surprising to note also, that of the fifteen species captured at Kadiak only four occur in the list from Popof, as determined by Mr. Banks. The series includes the two Phalangids *Sclerobunus brunneus* Banks and *Liobunum exilipes* (Wood), the former described from Washington, the latter from California.

POPOF ISLAND, SHUMAGIN ISLANDS

July 7-18.—The most extensive and satisfactory collection of insects secured by the Expedition was made on Popof Island, one of the Shumagin group. This group lies midway between Kadiak Island and Unalaska, and is separated by a narrow strait from the mainland of the Alaska Peninsula. Several islands go to form the group, the principal ones being Unga, Nagai, and Popof. On the morning of July 7 a small party was landed at Sand Point, a fishing station on Popof Island,

and immediately commenced an investigation of the insular fauna.

Popof Island is about ten miles long by five wide, and geologically speaking is of purely volcanic origin. It is treeless, and the largest forms of vegetation are dwarf alder bushes and a variety of willows. The central part is very little above sea level, but from this the land slopes up in all directions, terminating in most cases in promontories and cliffs overlooking the ocean. The form of the island thus suggests a great shallow bowl. On the southern side a large hill rises to an elevation of about 1,200 feet, while the northern side is very rugged, the principal feature being a long semicircular range of hills rising in the middle to an altitude of over 1,700 feet. The drainage of the basin-like area in the interior is carried to the sea by a small stream which tumbles into the ocean in a series of sparkling cascades. The interior also contains several small lakes occupying depressions in the tundra.

The investigation of the insect fauna of this charming isle was a never-to-be-forgotten experience. The limited area, and the ease with which it could be traversed, together with the favorable weather that by good fortune was vouchsafed us, and the length of the stay (ten days) made it possible to assemble a reasonably representative collection of the insects present at that season of the year.

The time of our visit happened to coincide with the height of the flowering season. A memorandum of the flowering plants collected, necessarily very incomplete, makes a list of over one hundred species. On the slopes near the sea shore the principal elements in this varied flora were the omnipresent *Heracleum lanatum*, *Cælopleurum gmelini*, *Geranium erianthum*, *Castilleja pallida*, *Achillea millefolium*, *Lathyrus maritimus*, *Iris setosa*, *Sieversia calthifolia*, *Cypripedium guttatum*, *Orchis aristata*, *Aconitum delphinifolium*, and *Polemonium cæruleum*. In the marshy places and on the tundra were another series, such as *Mimulus langsдорffii*, *Empetrum nigrum*, *Pinguicula vulgaris*, *Betula* sp., *Petasites frigida*, *Arctostaphylos* sp., *Valeriana capitata*, *Drosera vulgaris*, *Comarum palustre*, *Swertia perennis*, *Habenaria obtusata*, *Habenaria bracteata*, and *Parnas-*

sia palustris. On the slopes of the hill sides grew *Campanula lasiocarpa*, *Pedicularis verticillata*, *Circæa alpina*, *Anemone narcissiflora*, *Sieversia rossii*, *Rhododendron kamtschaticum*, *Salix* spp., and *Alnus sinuata*, with occasional stunted bushes of *Sambucus*. The hill tops, at an elevation of 1,000 feet and over, were the homes of beautiful alpine plants, delicate saxifrages, the curious *Chrysosplenium beringianum*, the dwarf dandelion, tiny Cruciferæ, and the beautiful alpine poppy.

The number of species of insects collected during the ten days of our stay on Popof Island was 282. It seems worth while to consider these somewhat in detail, as studies of insular faunas are always interesting from the point of view of geographic distribution. Of the entire series 90 species have been described as new. Of these, 70 were found on Popof Island only, so that so far as the record goes their distribution is limited to this station. Of the 282 species, 22 were collected at Sitka, 54 at Kukak, and 31 at Kadiak, while 11 were European species not previously known to exist on the American continent. The number new to the fauna of Alaska must represent a very large percentage of the total.

As usual the Diptera formed the principal element in the insect fauna, comprising over 100 species. Of these, 30 were obtained solely on Popof Island, 40 on Popof and also at Kukak Bay, and 18 on Popof and also at Sitka. Ten species were European forms new to America. Among the novelties in this group may be mentioned the following — Mycetophilidæ: *Neoempheria kincaidi* sp. nov. Coq.; Chironomidæ: *Ceratopogon arcticus* sp. nov. Coq.; *Ceratopogon femoratus* Fabr., a European species new to America; Empidæ: *Empis infumata* sp. nov. Coq., *Empis laniventris* Eschs. (notable on account of the enormous numbers in which it occurred at the flowers of *Geranium erianthum*), *Rhamphomyia villipes* sp. nov. Coq., *Platypalpus diversipes* sp. nov. Coq., *Platypalpus gilvipes* sp. nov. Coq.; Dolichopodidæ: *Dolichopus barycnemis* sp. nov. Coq., *Dolichopus festinans* Zett. (new to American lists), *Dolichopus plumipes* Fall. (also new to America); Syrphidæ: *Platychirus albimanus* (Fabr.), an addition to American lists; Anthomyidæ: *Lasiops calvicrura* sp. nov. Coq., *Hylemyia spini-*

ventris sp. nov. Coq., *Hylephila silvestris* (Fallen), new to the American fauna; Sarcophagidæ: *Pogonota kincaidi* sp. nov.

A single specimen of *Arctophila flagrans* O. S. captured upon the bank of the creek, attracted attention on account of the surprising resemblance it bore to one of the common bumble-bees (*Bombus sylvicola* Kirby) found on the same island. This was interpreted as an example of mimetic resemblance.

On the top of an exposed and barren hill top several specimens were secured of a peculiar brachypterous Tipulid (*Tipula septentrionalis* Loew). These creatures presented a strange sight as they ran about among the scanty herbage after the fashion of Phalangids. The situations in which they live are exposed to heavy winds, and it seems probable that their short wings are an adaptation to an unfavorable environment, since winged forms would be more liable to be blown away from the land and lost at sea.

The coleopterous fauna was so meager that in the beginning it seemed as if the order was on the verge of extinction upon the island, but by painstaking search a series of thirty-three species was assembled. Strange to say, however, it was found that fifteen of these species were represented in the collection by single specimens, and of the remainder six were represented by two specimens each. The only beetle at all common was the Cerambycid *Leptalia macilenta*, which occurred in multitudes upon the umbels of *Heracleum*. The reason for this dearth of individuals in the Coleoptera was not obvious, and the only explanation offered is that certain of the rodents which swarm in the tundra use the beetles for food and thus destroy the Coleoptera that ordinarily make their homes upon the ground. For example, the family Carabidæ is represented in the collection by unique specimens of *Bembidium incertum* Mots., *Bembidium mutatum* G. & H., *Trechus chalybeus* Mann., *Pterostichus luczoti* Dej., *Amara hyperborea* Dej., and *Calathus ingratus* Dej.

Three beetles new to the fauna of Alaska appear in the Popof Island collections—*Mycetoporus lepidus* Erich., *Bembidium mutatum* G. & H., and *Rhantus bistriatus* Bergst. *Helophorus auricollis* was previously known only from Unalaska.

Chrysomela subsulcata Mann. was recorded from the Pribilof Islands and not elsewhere; a single specimen was found feeding on a dwarf willow bush high up among the hills.

The only butterflies observed during our stay were *Pieris napi hulda* Edw. and *Brenthis frigga saga* Staud. The latter, of which five specimens were captured, makes its home in the tundra. In habits it is very shy, since it will not fly till almost stepped upon, and then it flutters for a short distance close to the ground, quickly hiding itself in the thick moss. This butterfly is no doubt in constant danger of being blown away from its island home, and its cautious habits are the result of natural selection, which has operated to eliminate the more adventurous individuals.

The list of Popof moths comprises eighteen species, including an Arctian, *Platarctia parthenos* Harr.; six Noctuidæ: *Noctua c-nigrum* L., *Hadena ducta* Gr., *Pachnobia alaskæ* Thunb., *Ommatostola popofensis* sp. nov. Smith, and *Anarte lanuginosa* sp. nov. Smith; six Geometridæ: *Mesoleuca variata* Schiff., *Petrophora montanata* Borkh., *Petrophora nemorella* Hulst, *Tephroclystis perfusca* Hulst, *Tephroclystis miserula* Grt., and *Rheumaptera hastata* L.; two Pyralidæ: *Scoparia centuriella* Schiff. and *Crambus interminellus* Walk.; one Pterophoridæ: *Platyptilia petrodactyla* Walk.; two Tortricidæ: *Sciaphila moeschleriana* Wocke. and *Sericoris bipartitana* Clem. The Noctuids, almost without exception, were taken upon the umbels of *Heracleum*.

The list of Hymenoptera does not include any representatives of the Sphegoidea. The Apoidea includes only members of the genus *Bombus*, of which five species were secured—*B. couperi* Cr., *B. oregonensis* Cr., *B. pleuralis* Nyl., *B. sylvicola* Kby., and *B. mixtuosus* sp. nov. Ashmead. Bumble-bees were observed to play an important rôle in the fertilization of many flowering plants. They were noted in the act of visiting the blossoms of *Geranium erianthum*, *Lupinus nootkatensis*, *Polemonum cæruleum*, *Mimulus langsdorffii*, *Pedicularis langsdorffii*, *Castilleja pallida*, and *Heracleum lanatum*.

The number of saw-flies was exceptionally large, comprising 19 species, the gall-producing forms predominating. The list

includes the following: *Pachynematus affinis* Marlatt, *Pachynematus gotarus* sp. nov., *Euura insularis* sp. nov., *Pontania* 5 spp. nov., *Pteronus shumagensis* sp. nov., *Dolerus elderi* sp. nov., *Pachyprotasis nigrofasciatus* Esch., *Tenthredo ferrugineipes* Cr., *T. varipicta* Nort., *T. mellina* Nort., *T. harrimani* sp. nov., *T. dissimulans* sp. nov., *T. bivittata* sp. nov., *Trichiosoma triangulum* Kby., and *Allantus heraclei* sp. nov. The species of *Tenthredo* were of special interest. At all previous stations the members of this genus had been of species known to be of widespread distribution on the Pacific Coast and elsewhere. At Popof Island all but three of these familiar forms were lacking and their places were occupied by species hitherto unknown to science. Of the new forms the most striking was *Tenthredo dissimulans*, which is of a peculiar greenish color, and makes its home upon the umbels of *Heracleum*. Here it lies in wait for unwary visitors, especially Diptera, and being colored in harmony with the greenish flower stalks among which it lives, gives no warning to its victims. All of the *Tenthredos* were found on the flowers of *Heracleum*, and the same was true of *Allantus heraclei*.

Of parasitic Hymenoptera Mr. Ashmead has determined 55 species from Popof Island, of which only five had been previously described. One genus (*Hypocryptus*) was new to the American fauna, and the same is true of the species *Ischneutes reunitor* Nees, a European type of the Braconidæ.

The Heteroptera of the island included two Capsids and three species of *Corisa*. The Homoptera were better represented by nine species, of which five were leaf-hoppers; one (*Nectarophora epilobii* sp. nov.) belonged to the Aphidæ and two to the Psyllidæ.

The series of Neuropteroids was unexpectedly large, comprising fourteen species. The list includes two members of the Perlidæ, three Ephemeridæ, and nine Trichoptera. Several large dragon-flies were observed, but they escaped capture. They were evidently of the same species (*Æschna juncea* L.) as an individual captured on the neighboring island of Unga by Professor Ritter.

The arachnid fauna was not very extensive, including but

fourteen species, most of them well known. Only two were new, according to Mr. Banks — *Cornicularia varipes* and *Mitopus dorsalis*. The last mentioned, which is a Phalangid, was found beneath stones at an elevation of 1,700 feet.

Only one species of the Myriapoda was seen. Dr. Cook has determined it as *Tomotænia chionophila* (Wood).

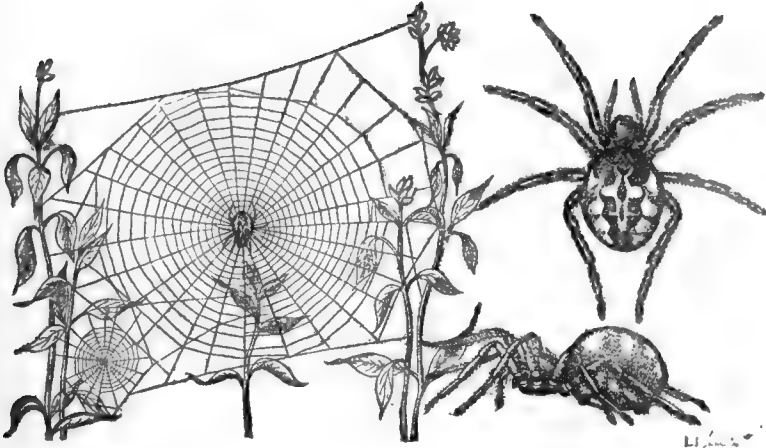
UNIVERSITY OF WASHINGTON,

January 15, 1903.

ARACHNIDA OF THE EX-
PEDITION

The following paper on the Arachnida of the Expedition, by Nathan Banks, Division of Entomology, U. S. Department of Agriculture, was originally published in the Proceedings of the Washington Academy of Sciences, vol. II, pp. 477-486, Dec. 20, 1900. It is here reprinted from the same electrotpe plates, so that it may be quoted exactly as if it were the original. The original pagination has been preserved and transferred to the inner or hinge side of the page, where it is enclosed in brackets, thus [478]; while the consecutive pagination of the present volume has been added in the usual place. In the plate the original number and running headline, slightly abbreviated, have been preserved [in brackets], while the volume designation and serial plate number have been added in the usual place. The original text references to the plate are unchanged. The present headpiece and title have been substituted for the running heading of the Academy's Proceedings and the original title, which was: *Papers from the Harriman Alaska Expedition. XI. Entomological Results (5): Arachnida*. No other alterations have been made.

EDITOR.



ARACHNIDA OF THE EXPEDITION

BY NATHAN BANKS

THE spiders collected on the Harriman Expedition show considerable affinity to those of the State of Washington, but there are some, principally among the small Theridiidæ, that are peculiar to Alaska. Dr. Marx, in the Proceedings of the Entomological Society of Washington (Vol. II, p. 186), gave a list of Arctic spiders, including those known to him from Alaska, in which there were 62 species, many of them undescribed. In the list of 52 species given below are at least six not known to Marx. There are no remarkable forms in the collection. Of the five harvest-spiders collected, three are known from California and Washington, one recently described from the Commander Islands, and one which appears to be new. The one Pseudoscorpion is common in the coast regions of Oregon and Washington. Of the two mites, one is peculiar on account of its slenderness and armed hind legs.

Besides the 52 species recorded in the list, there are a few specimens of small Theridiidæ which can not be treated without more material, including the male sex.

ARANEIDA.**Family DRASSIDÆ.*****Prosthesima niger* Banks.**

Prosthesima niger BANKS, Trans. Amer. Entom. Soc., p. 62, 1896.

Two specimens, one from Muir Glacier (June), and one from Metlakahla. Known from State of Washington.

Family CLUBIONIDÆ.***Clubiona pacifica* Banks.**

Clubiona pacifica BANKS, Trans. Amer. Entom. Soc., p. 65, 1896.

Two specimens, one adult from Juneau, and one young from Kukak Bay. Previously known from Washington.

Family AGALENIDÆ.***Agalena pacifica* Banks.**

Agalena pacifica BANKS, Journ. N. Y. Entom. Soc., p. 89, 1896.

Agalena curia MCCOOK, Amer. Spiders, III, pl. xxix, figs. 2, 3.

A few specimens from Kadiak (July). Known from California and Washington.

***Cybæus reticulatus* Simon.**

Cybæus reticulatus SIMON, C. R. Soc. Entom. Belg., p. LVI, 1886.

Many specimens from Sitka, Yakutat Bay, Kadiak, Popof Island, and Metlakahla. Previously known from Oregon and Washington.

***Cybæus pusillus* Simon.**

Cybæus pusillus SIMON, C. R. Soc. Entom. Belg., p. LVII, 1886.

Two specimens from Berg Bay (June). Known from Washington.

Family THERIDIIDÆ.***Theridium sexpunctatum* Emerton.**

Theridium sexpunctatum EMERTON, Trans. Conn. Acad., VI, p. 12, 1882.

Theridium marxi KEYSERLING, Die Spinn. Amer. Therid., II, p. 231, 1886.

Several specimens from Sitka, Yakutat Bay, Berg Bay, and Kadiak (June and July). Known from New York, New Hampshire, and Washington.

***Ceratinella* sp.**

Plate XXIX, fig. 5.

Cephalothorax, sternum and mandibles reddish; abdomen black; legs pale reddish except the patellæ, which are pale yellowish; no abdominal plate except a small piece at base of the spinnerets; P.M.E.

once and one-half their diameter apart, twice their diameter from the equal P.S.E.

One female from Yakutat: probably new, but better not named in absence of the male.

***Cornicularia recurvata* sp. nov.**

Plate XXIX, fig. 9.

Cephalothorax red-brown, mandibles yellow-brown, sternum and abdomen black, legs pale yellowish. Head of male high, with a recurved horn in front, tipped with stiff, back-directed hairs; sternum broad, convex, blunt-pointed between the hind coxæ; legs slender, anterior tarsus nearly as long as the metatarsus, which is much shorter than the tibia; male palpus simple, tibia short, with a short, pointed process on outer tip, hook stout and short, bulb very large, terminating in a short process; no long stylet. Length 1.7 mm.

One male from the Muir Glacier; readily known by the large, recurved horn.

Type.—Cat. no. 5268, U. S. National Museum.

***Cornicularia varipes* sp. nov.**

Plate XXIX, fig. 4.

Cephalothorax reddish, shining, margined with black; head blackish, with median and lateral black lines; mandibles red-brown; sternum reddish, scarcely rugulose, maxillæ brown; abdomen black; legs with femora and tibiæ reddish, the former at tip and the latter at base yellowish; metatarsi yellowish; tarsi brown; P.M.E. about their diameter apart and about the same distance from the equal P.S.E.; A.M.E. smaller, hardly their diameter apart, about their diameter from the larger A.S.E.; between the M.E. is a faint trace of a swelling, quadrangle of M.E., much higher than broad behind; abdomen about twice as long as wide, with short hairs. Length 2.6 mm.

One female from Popof Island. The colors of the legs will serve to separate it from the other species of the genus until the male is known.

Type.—Cat. no. 5269, U. S. National Museum

***Cornicularia* sp.**

One female, similar to *C. communis* Emer., but different by shape of epigynum. Yakutat (June).

***Lophocarenum* sp.**

One female from Muir Glacier.

***Gonglydium alascensis* sp. nov.**

Plate XXIX, fig. 3.

Cephalothorax, legs and mandibles pale yellowish; eyes on black

spots; sternum and abdomen black, spinnerets pale. Posterior eye-row slightly procurved; P.M.E. their diameter apart, about as far from the equal P.S.E., which touch the A.S.E.; A.M.E. smaller, scarcely their diameter apart, and a little further from the larger A.S.E. Legs slender, tibia with two spines above, one near base, one near tip, one spine on patella; mandibles vertical, scarcely divergent, without teeth in front; abdomen one and two-thirds as long as broad; head of male not elevated; the epigynum, which is rather prominent from side view, shows a broad median septum with an oval cavity each side. Length 2.1 mm.

Three specimens from Berg Bay.

Type.—Cat. no. 5270, U. S. National Museum.

Gonglydium sp.

Two females of a pale species from the Muir Glacier; they may belong to some species of which the male only is known. The epigynum is an elliptical area with a nearly square cavity in posterior part; on middle of hind margin is a denticle projecting forward.

Gonglydium falsificum (Keys.).

Erigone falsificum KEYSERLING, Die Spinn. Amer. Therid., II, p. 259, 1886.

One female from the Muir Glacier agrees well with the description and figure of Keyserling. The male is unknown. Described from Alaska.

Erigone coloradensis Keys.

Erigone coloradensis KEYSERLING, Die Spinn. Amer. Therid., II, p. 168, 1886.

A few specimens from Kadiak and Yakutat (June). Known from Colorado and Washington.

Erigone simillima Keys.

Erigone simillima KEYSERLING, Die Spinn. Amer. Therid., II, p. 170, 1886.

Several from Popof Island, and Saldovia, Cook Inlet. Close to the preceding and probably but an extreme form of it. Described from Alaska.

Erigone famelica Keys.

Plate XXIX, figs. 7, 8.

Erigone famelica KEYSERLING, Die Spinn. Amer. Therid., II, p. 186, 1886.

A pair from Kadiak (July), and one from the Muir Glacier. The figure gives a different view of the palpus from that of Keyserling. Described from Alaska.

Pedanostethus riparius Keys.

Pedanostethus riparius KEYSERLING, Die Spinn. Amer. Therid., II, p. 265, 1886.

Several females from Berg Bay, Yakutat, the Muir Glacier, and Orca (June). Known from Washington and Lake Superior.

***Linyphia pusilla* Keys.**

Linyphia pusilla KEYSERLING, Die Spinn. Amer. Therid., II, p. 55, 1886.

Many specimens from Sitka, Yakutat Bay, Kakiak and Metlakahtla. Europe and northern United States.

***Linyphia phrygiana* Keys.**

Linyphia phrygiana KEYSERLING, Die Spinn. Amer. Therid., II, p. 60, 1886.

One from Sitka (June). Europe and northern United States.

***Linyphia reducta* Keys.**

Linyphia reducta KEYSERLING, Die Spinn. Amer. Therid., II, p. 73, 1886.

Two young females from Cook Inlet. Described from Washington.

***Linyphia sitkænsis* Keys.**

Linyphia sitkænsis KEYSERLING, Die Spinn. Amer. Therid., II, p. 86, 1886.

One female from Yakutat. Described from Alaska.

***Labulla alticulata* Keys.**

Labulla alticulata KEYSERLING, Die Spinn. Amer. Therid., II, p. 94, 1886.

One young specimen from Juneau. Described from Washington.

***Lepthyphantes alascensis* sp. nov. Plate XXIX, fig. 6.**

Cephalothorax, legs and mandibles pale yellowish; eyes on black spots; sternum blackish; abdomen black, a broad pale stripe on each upper side, spinnerets pale. Posterior eye-row slightly recurved, P.M.E. less than their diameter apart, scarcely farther from the nearly equal P.S.E., A.M.E. smaller, less than their diameter apart, much farther from the larger A.S.E., quadrangle of M.E. much higher than broad behind, S.E. touching. Mandibles long, vertical, plainly divergent, with three large teeth on front lower margin. Leg I longest, tibia I longer than metatarsus I, two spines above on all tibiæ, one near base, one near tip; one spine on patella above. Abdomen rather high, one-fourth longer than broad; the epigynum extremely prominent, the finger projecting away from abdomen. Length 2.8 mm.

Several specimens from Yakutat.

Type.—Cat. no. 5271, U. S. National Museum.

***Bathyphantes arctica* Keys.**

Bathyphantes arctica KEYSERLING, Die Spinn. Amer. Therid., II, p. 85, 1886.

A few specimens from Sitka, Berg Bay, and Kadiak (July). Described from Alaska; also known from Washington.

Bathyphantes sp.

One female of a pale species, with short legs, from Yakutat (June).

Family DICTYNIDÆ.**Amaurobius pictus** Simon.

Amaurobius pictus SIMON, Bull. Soc. Zool. France, p. 3 (sep.), 1884.

Two specimens from Cook Inlet and Fox Point (July). Known from California, Oregon, Washington, and British Columbia.

Family EPEIRIDÆ.**Epeira trifolium** Hentz.

Epeira trifolium HENTZ, Spid. U. S., p. 110, 1875.

Several specimens from Cook Inlet and Kadiak, June, July. Spread throughout the United States.

Epeira patagiata Emerton.

Epeira patagiata EMERTON, Trans. Conn. Acad., VI, p. 305, 1884.

Many specimens from Kadiak (June, July), Juneau, Kukak Bay (June), and Popof Island. Europe and northern United States.

Epeira displicata Hentz.

Epeira displicata HENTZ, Spid. U. S., p. 117, 1875.

A few specimens from Juneau and Kadiak (July). Entire United States.

Tetragnatha extensa Emerton.

Tetragnatha extensa EMERTON, Trans. Conn. Acad., VI, p. 333, 1884.

Many specimens from Kadiak (July), Fox Point (July), Sitka, and Metlakahtla (June). Europe and northern United States.

Tetragnatha laboriosa Hentz.

Tetragnatha laboriosa HENTZ, Spid. U. S., p. 131, 1875.

Many specimens from Kukak Bay, Kadiak (July), Yakutat (June), Popof Island, Metlakahtla (June), and Sitka. All over the United States.

Zilla californica Banks.

Zilla californica BANKS, Jour. N. Y. Entom. Soc., p. 90, 1896.

One male from Sitka (June). Known from California and Washington.

Family THOMISIDÆ.

Xysticus borealis Keys.

Xysticus borealis KEYSERLING, Verh. zool.-bot. Ges. Wien, p. 668, 1882.

A few specimens from Popof Island and Kadiak (July). Described from Alaska.

Misumena vatia Keys.

Misumena vatia KEYSERLING, Die Spinn. Amer. Later., p. 101, 1880.

One pair from Metlakatla (June). Europe and the United States.

Tibellus oblongus Keys.

Tibellus oblongus KEYSERLING, Die Spinn. Amer. Later., p. 196, 1880.

A few specimens from Cook Inlet and Kukak Bay (June). Europe and the northern United States.

Family LYCOSIDÆ.

Lycosa albohastata Emerton.

Lycosa albohastata EMERTON, Trans. Conn. Acad., ix, p. 423, 1894.

Two specimens from Popof Island. Known from British Columbia.

Lycosa pratensis Emerton.

Lycosa pratensis EMERTON, Trans. Conn. Acad., vi, p. 483, 1885.

Several specimens from Cook Inlet and Orca (June). Known from the northern United States.

Lycosa quinararia Emerton.

Lycosa quinararia EMERTON, Trans. Conn. Acad., ix, p. 422, 1894.

One female from Popof Island appears to belong here. Described from British Columbia.

Lycosa sp.

One female from Kadiak (July) appears to be near *L. beani* Em., but does not agree very well.

Pardosa grœnlandica Thorell.

Pardosa grœnlandica THORELL, Proc. Bost. Soc. N. H., p. 498, 1875.—
EMERTON, Trans. Conn. Acad., ix, p. 423, 1894.

Several specimens from the Muir Glacier (June). Known from boreal America.

Pardosa glacialis Thorell.

Pardosa glacialis THORELL, Öfv. K. Vetensk., Akad. Förh., p. 159, 1872.—
EMERTON, Trans. Conn. Acad., ix, p. 424, 1894.

A few specimens from Popof Island. Known from boreal America.

***Pardosa uncata* Thorell.**

Pardosa uncata THORELL, Bull. U. S. Geol. and Geog. Surv. Terr., III, no. 2, p. 508, 1877.—EMERTON, Trans. Conn. Acad., IX, p. 425, 1894.

Two specimens from Juneau and Metlakatla. Known from New Hampshire, Colorado, and British Columbia.

***Pirata* sp.**

One female of a large species from Berg Bay. It is probably new.

PHALANGIDA.***Sclerobunus brunneus* Banks.**

Sclerobunus brunneus BANKS, Trans. Amer. Entom. Soc., p. 152, 1893.

Several specimens from Yakutat Bay, Juneau, Cook Inlet, Orca (June), and Kadiak (July). Known from Washington.

***Phlegmacera occidentalis* Banks.**

Phlegmacera occidentalis BANKS, Psyche, p. 51, March, 1894.

Several specimens, all very young, from Sitka (June), Berg Bay, Yakutat (June), and Popof Island. Known from Oregon and Washington.

***Leptobunus borealis* Banks.**

Leptobunus borealis BANKS, Arachn. Commander Isl., p. 350, 1899.

One specimen from Popof Island. Described from the Commander Islands.

***Liobunum exilipes* (Wood).**

Phalangium exilipes WOOD, Comm. Essex Inst., VI, p. 23, 1868.

Two specimens from Yakutat (June), Kadiak (July). Known from California, Nevada and Washington.

***Mitopus dorsalis* sp. nov.**

Plate XXIX, fig. 2.

Gray: a darker median vase-mark, not reaching end of abdomen; through this there is a pale median line from the eye-tubercle backward; cephalothorax and sides of abdomen more or less mottled with pale, dark gray, and black; venter pale, dotted with gray; legs pale, indistinctly marked with brown at ends of joints, the tarsus on apical half blackish; palpi lineate with brown. Eye-tubercle near posterior margin of cephalothorax, quite high, with two rows of small teeth above; on middle of front margin of cephalothorax is a group of small teeth; rest of cephalothorax and dorsum of abdomen with many scattered denticles, those on the latter mostly in transverse rows; legs with many black denticles arranged in rows, no false articulations in meta-

tarsus I, nor in tibia II; palpi with rows of denticles, the patella and tibia on inner side swollen and there thickly clothed with short, erect spine-like hairs, claw not toothed; no supra-mandibular spine. Length 5 mm., femur II, 4 mm.

Two from Popof Island (one not adult and not fully marked from the mountain top).

Type.—Cat. no. 5272, U. S. National Museum.

PSEUDOSCORPIONIDA.

Ideobisium threveneti (Simon).

Obisium threveneti SIMON, Ann. Soc. Entom. France, p. 156, 1878.

Several examples from Cook Inlet, Lowe Inlet (June), Long Inlet, Popof Island, and Yakutat. Known from California, Oregon and Washington.

ACARINA.

Gamasus sp.

Several specimens from Kadiak on a *Necrophorus*, and from Sitka; none in an adult condition, and no males.

Holostaspis exilis sp. nov.

Plate XXIX, fig. 1.

♂. Pale yellowish, the legs still paler. Body about twice as long as broad, tapering each way, broadest before third legs, but slightly convex above, clothed with scattered long, simple hairs, more numerous at tip of body; each side at posterior third of the dorsal shield is a row of four or five round, reddish, impressed dots. Palpi slender; leg I slender, no claw nor sucker at tip; leg II with fourth joint thickened and with a large tooth below, and a small one above, the sixth joint with a small tooth at base and a long blunt spine at tip; legs III with a spur on hind tip of second joint, and one below near middle of third joint; leg IV with the second joint swollen on anterior face, and just before tip with a long slender process; bifid at tip. The peritreme runs directly to the stigmata which are above the third coxæ. The sternal plate is very narrow behind, so that the hind coxæ are not separated by half their width. Length 2 mm.

♀. What appears to be the female of this species is smaller, more reddish, the abdomen broadly rounded behind, the hind coxæ are more widely separated, yet much closer than third coxæ, the legs are unarmed; the dorsal shield shows a slight incision near middle of each side, indicating the division of the immature forms. Length 1.5 mm.

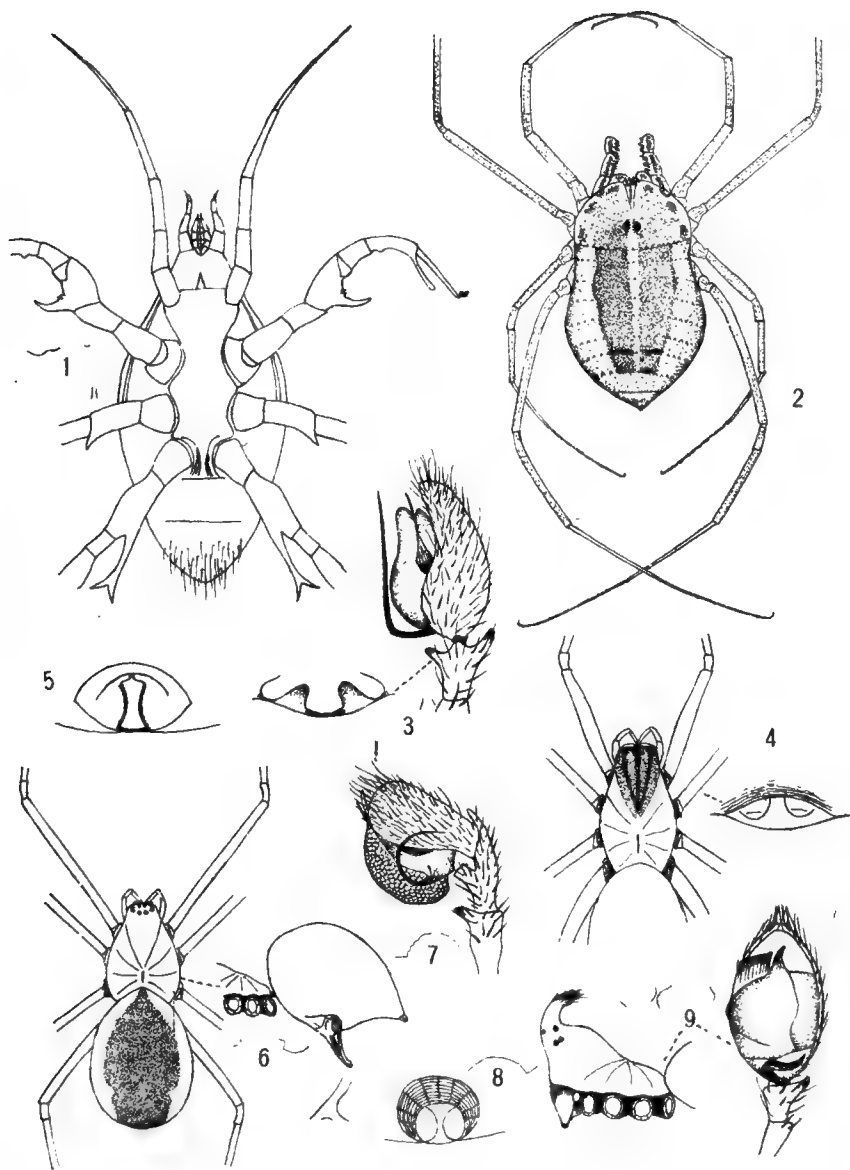
Several specimens from Yakutat, Berg Bay, Sitka, and Popof Island.

Type.—Cat. no. 5273, U. S. National Museum.

PLATE II.

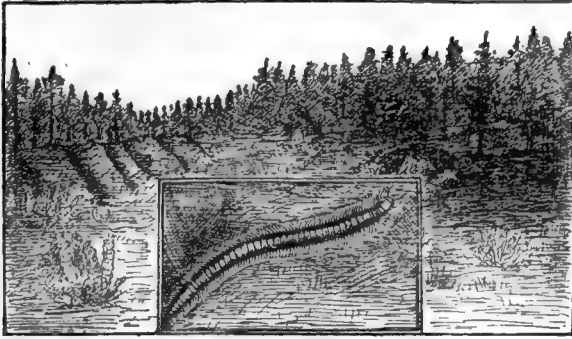
[Proc. Wash. Acad. Sci., Vol. II, Pl. XXIX.]

- FIG. 1. *Holostaspis exilis*. ♂
2. *Mitopus dorsalis*.
3. *Gonglydium alascensis*.
4. *Cornicularia varipes*. ♀
5. *Ceratinella* sp.
6. *Leptyphantes alascensis*. ♀
7. *Erigone famelica*, palpus.
8. *Erigone famelica*, epigynum.
9. *Cornicularia recurvata*. ♂



ALASKA ARACHNIDS

MYRIAPODA OF NORTHWESTERN
NORTH AMERICA



MYRIAPODA OF NORTHWESTERN NORTH AMERICA

BY O. F. COOK

THE four classes of Arthropoda formerly arranged under the name Myriapoda are no longer believed to constitute a natural group, the agile, carnivorous Chilopoda with one pair of legs on each joint of the body having closer affinities with the true insects than with the slow-moving Diplopoda or thousand-legged 'worms.' The latter subsist on decaying vegetable matter and have two pairs of legs on most of the body segments. Related to the Diplopoda are two other classes of minute animals, the Symphyla and Pauropoda, not yet discovered in Alaska.

Class DIPLOPODA.

The Diplopoda are a predominately tropical group, though with numerous representatives in the temperate regions, some of which have been reported from rather high latitudes in Scandinavia and also in Siberia, but only three species have been reported from Alaska. Unlike the Insects and Molluscs, the Diplopoda attract little popular attention, and they are neither useful nor injurious to the extent of demanding investigation for economic reasons. They have, however, a unique scientific value as probably affording a better foundation for distributional studies than any other group. Owing to their retiring habits, slow movements, lack of wings, and inability to withstand ex-

posure to unfavorable conditions, they have been unable to extend themselves in other than the most gradual manner, so that identity, or even similarity, of diplopod faunas affords practically indubitable evidence, not only of land connection, but of existence of continuously favorable conditions, both in space and in time. On this account a comparison of the Diplopoda of northwestern America with those of northeastern Asia may yield valuable evidence regarding the nature and extent of the land connection supposed by many naturalists to have existed formerly. The Diplopoda of the Harriman Expedition are thus an initial contribution to this phase of the trans-Bering question, though their significance can not be estimated until the Siberian representatives of the group have been studied.

The systematic study of the Diplopoda is a difficult and backward province of zoology; the literature is fragmentary and scattered, and the animals, though quite harmless, are generally avoided by all except the most intelligent and zealous collectors. The Diplopods of the Pacific Coast region have had little attention subsequent to the papers of Wood and Harger, published over thirty years ago, and it has accordingly seemed permissible to insert here some of the preliminary results of a long-deferred examination of the considerable amount of material accumulated at Washington during the last decade.

As a means of encouraging the collection of Diplopoda in the Northwest, analytical keys to the higher groups and general notes likely to facilitate diagnosis have been included in the present report. The characters used for these purposes have been chosen with a view to convenience, and are not in all cases of general application to the Diplopoda of other regions.

ANALYTICAL KEY TO THE SUBCLASSES OF DIPLOPODA.

- Body without external armor; the soft skin beset with toothed and barbed bristles.....Subclass PSELAPHOGNATHA.
 Body with a hardened exoskeleton; bristles few, inconspicuous, or wantingSubclass CHILOGNATHA.

Subclass PSELAPHOGNATHA.

The subclass Pselaphognatha contains only the small caterpillar-like Diplopod *Polyxenus* and a few related genera. The group is of very general distribution and is probably very old geologically, one of the Carboniferous forms (*Palæocampa*) being of large size. A species of *Polyxenus* from the State of Washington has been described by

Professor Kincaid.¹ The European *P. lagurus* extends far north, and its American relatives will probably be found in southern Alaska.

Subclass CHILOGNATHA.

This subclass includes all the remaining Diplopoda, with over a hundred genera and many hundreds of species. There is great diversity of form and structure, but all have the body protected by more or less complete chitinized rings.

ANALYTICAL KEY TO THE WEST AMERICAN ORDERS OF CHILOGNATHA.

Body composed of 20 (rarely 19) segments, which are complete chitinous rings, without sutures.....Order MEROCHETA.

Body composed of 30 (rarely 26 or 28) segments or more; fusion of primitive sclerites not complete, at least the pedigerous laminae separated by distinct sutures.

Males with eight pairs of normal legs in front of the 4-5-jointed gonapods² which are the posterior pair of the seventh segment and the anterior pair of the eighth; head and mouth parts partly reduced, the latter suctorial rather than manducatory.

Order COLOBOGNATHA.

Males with seven more or less normal legs in front of the seventh segment, of which the anterior, and usually both pairs, are transformed into simple or 2-jointed gonapods; head large, the mouth parts well developed and distinctly manducatory.

Segments 1-5 with a single pair of legs each; pleuræ indicated by a longitudinal suture, which is met above by two transverse sutures crossing the dorsal part of the segment; labrum with a median sinus..... Order ANOCHETA.

Segment 3 or segment 4 footless, segment 5 with two pairs of legs; pleuræ entirely obliterated; transverse suture single or wanting; labrum with a median tooth.

Pedigerous laminae free; last segment with spinning organs in the form of setiferous papillæ.....Order CÆLOCHETA.

Pedigerous laminae adnate; last segment without setiferous papillæ.....Order ZYGOCHEETA.

¹ *Polyxenus pugetensis*, Entomological News, ix, p. 192, 1898. This form was also collected by Professor Kincaid at Metlakatla, Alaska, while with the Harri-man Expedition.

² This term is used in the present paper as a substitute for 'copulatory legs,' in accordance with the excellent suggestion of the German zoologist Dr. C. Verhoeff.

Order Merocheta.

Diplopoda with 19 or 20 segments, the superficial hardened parts of which are coalesced into complete rings. Eyes are wanting in all members of this order, which nevertheless contains a large proportion of the bright-colored species of the Diplopoda. Nearly all Merocheta have distinct lateral carinæ or projections from the segments, on which are located the repugnatorial pores or openings of glands which in members of this order secrete prussic acid.¹ It is also characteristic that the pores, which begin on segment 5, are not found on all the other segments but are always absent, at least from segment 6, and usually from several others. The normal or most general pore formula, that which prevails on all the species described below, is 5, 7, 9, 10, 12, 13, 15, 16, 17, 18, 19.

ANALYTICAL KEY TO WEST AMERICAN FAMILIES OF MEROCHETA.

Body compact, the carinæ overlapping or continuous; claws of anterior legs of males abruptly curved beyond the middle.

Family XYSTODESMIDÆ.

Body moniliform, the carinæ distinctly separated; claws slightly and evenly curved.

Repugnatorial pores lateral, located in small depressions of the thickened margins of the carinæ; dorsal surface evenly convex, smooth.....Family CHELODESMIDÆ.

Repugnatorial pores dorsal; margins of carinæ not thickened; dorsal surface uneven with convex areas or granules.

Family POLYDESMIDÆ.

Family XYSTODESMIDÆ.

The family Xystodesmidæ, to which the genus *Fontaria* belongs, is rich in species in eastern North America, but seems to have had no corresponding prosperity on the Pacific Coast. Two species of *Fontaria* have been described from California, but none is known from Oregon or Washington, though there is no apparent reason why they should not extend to British Columbia or southern Alaska, since the eastern representatives of the family are found as far north as New York and Michigan, where the climate would seem to be much more unfavorable.

The Xystodesmidæ are recognizable among North American Merocheta by their broad carinæ, the margins of which appear nearly con-

¹ Science, N.S., XII, No. 301, pp. 516-521, October 5, 1900.

tinuous because the segments fit into each other with unusual compactness. They are also readily separable from the *Chelodesmidæ*, the only West American group with which they could be confused, by the presence of a sharp spine on the lower distal corner of the second joint of the legs.

Xystocheir gen. nov.

Type.—*Xystocheir obtusa* sp. nov. from California.

The distinctness of this genus from the East American *Fontaria* is obvious from the totally different structure of the gonapod, which, instead of a single or a double prong arising from a broad base, is long and subconic, and ends in five spines, as described by Wood and shown in the accompanying figures. In addition there are several secondary sexual characters. The coxa of the third leg bears a large upright process; the coxa of the fourth leg has a broadly conic process on the mesial face at base, and there is a pair of more sharply pointed processes arising from the sternum between the same pair of legs. Smaller conic processes are also to be found on the sterna of segments 6, 8 and 9. All the legs of the male are crassate, and especially the second joint, the lateral face of which is strongly inflated into a large hemispherical prominence. The claws are long and are distinctly recurved beyond the middle.

XYSTOCHEIR OBTUSA sp. nov.

(Pl. III, figs. 1a-1c.)

Type.—No. 795, U. S. Nat. Mus. Collected in California by Capt. Thomas L. Casey.

Length of male about 28 mm.; width 5.5 mm.; length of antenna about 5.5 mm., of leg about 5 mm.

Color in alcohol fading to olive and olive-buff.

Segments with posterior corners but slightly produced, the poriferous callus small. Penultimate segment short, the angles of the carinæ not exceeding those of segment 18.

Gonapods with second joint subconic; lateral spine slender, nearly terete, inserted at nearly the same level as the anterior, its apex projecting distad to opposite the bases of the distal spines. Posterior distal spine narrow, flattened, turned inward and forward; anterior distal spine narrowly and sharply conic, the apex turned slightly forward.

A single male specimen without detailed locality. The small size and blunt carinæ distinguish this species from the next. The gona-

pod separate it from *X. dissecta*, and probably also from *X. furcifer*.

XYSTOCHEIR ACUTA sp. nov.

Type collected in California by Mr. Carl F. Baker.

Length of male about 35 mm., width 6.5 mm.

Color in alcohol fading to fawn-color; dorsum lighter, legs and antennæ darker.

Segments with posterior corners of carinæ strongly produced, and the projecting corner thickened to increase the size of the poriferous callus. Segment 19 exceeding segment 18, but the pores very minute, as in *X. obtusa*.

Gonapods with second joint oblong, scarcely tapering to near the end; lateral spine flattened, inserted somewhat above the level of the anterior, its apex scarcely exceeded by the distal spines. Posterior distal spine thin and leaf-like, the apex broadly rounded. Anterior spine relatively smaller than in *X. obtusa*.

This species differs from the preceding in its larger size and somewhat more convex dorsum, and in minor details of the gonapods, as described above, but the principal diagnostic feature seems to lie in the longer and much more produced lateral carinæ.

Several adult specimens of both sexes were received from Mr. Carl F. Baker, and are supposed to have been collected near Palo Alto, California. Another pair was obtained by Prof. Walter C. Blasdale in June, 1891, at Berkeley.

XYSTOCHEIR FURCIFER (Karsch).

Polydesmus (Fontaria) furcifer KARSCH, Troschel's Archiv f. Naturgesch., XLVII, p. 39, pl. 3, fig. 12, 1881.

Fontaria furcifer BOLLMAN, Bull. 46, U. S. Nat. Mus., p. 123, 1893.

Type in the Berlin Museum, collected by Forrer.

It is not impossible that this species may prove to be a synonym of *X. dissecta* (Wood), for although the description says that the gonapods are trifurcate at the base, the figure shows two principal divisions, as claimed by Wood, with a short, broad process from near the base of the posterior, instead of the slender spine of the two preceding species. Karsch's figure also represents the anterior of the two principal divisions as about twice as long as the process next above it, instead of about half as long as in *X. obtusa* and *X. acuta*.

XYSTOCHEIR DISSECTA (Wood).

Polydesmus dissectus WOOD, Proc. Phila. Acad. Sci., p. 129, 1867.

Fontaria dissecta BOLLMAN, Bull. 46, U. S. Nat. Mus., p. 123, 1893.

Wood's original specimens were from Fort Tejon, Kern County, California. It is not known whether they are still in existence, and no recent collections from the same region have been studied.

The generic affinities are obvious from the description of the gonapods, but it has seemed impracticable to identify the animals described above with Wood's species, because the lower or lateral spine, instead of being slender and nearly straight, is characterized as "broad, thin, obtuse and as it were twisted on itself."

Family CHELODESMIDÆ.

As at present constituted, this family extends throughout tropical and temperate America, where it is richly represented in genera and species. A few Asiatic species described under *Oxyurus*¹ also probably belong to the same series, which is at present defined by negative rather than by positive characters. The characters given in the following key apply to all the species in the United States, but the alliances of many tropical types are still very uncertain.

ANALYTICAL KEY TO THE WEST AMERICAN GENERA OF
CHELODESMIDÆ.

Gonapods very long, the anterior branch large and complex, with thin crests and plates; antennæ longer than width of body.

Genus *Chonaphe*.

¹ *Oxyurus flavolimbatus* L. Koch (Abh. der k. k. zöhl. bot. Gesell. Wien, 1877, p. 795, 1878) from Japan, *Polydesmus* (*Oxyurus*) *cyprinus* Humbert & Saussure (Verh. zöhl. bot. Ges. Vienna, XIX, p. 684), and *Oxyurus vestitus* C. L. Koch (System der Myriapoden, p. 139, 1847). Of the last species I have examined specimens belonging to the Berlin Museum, the same individuals studied by Attems. They are generically distinct from the United States species commonly referred to *Leptodesmus*, as well as from the Mexican type of this genus. The simple probe-like gonapod has been figured by Attems (Denksch. kais. Acad. Wiss. math.-naturw. Classe, LXVII, p. 594, pl. VI, fig. 134, Vienna, 1898). Koch's *O. vestitus* was the type of the genus *Oxyurus*. That this generic name was preoccupied was known to Bollman and other writers, who supposed, however, that it could be replaced by *Leptodesmus*. This inference being incorrect, it becomes necessary to rename Koch's genus *Oxyurus*, for which the term *Melaphe* is proposed, in allusion to the characteristic shape of the gonapod. The type of *Melaphe vestita* (Koch) came from Constantinople. It is also apparent from Attems's figures that *Melaphe cyprina* (Humbert & Saussure) may be safely associated as a second species. *Melaphe* differs from all the Chelodesmidæ of the United

Gonapods short, both branches simple; antennæ shorter than width of body.

Gonapods with two slender prongs of nearly equal size and length; dorsum strongly convex, the carinæ inserted at or below the middle line of side.....Genus *Isaphe*.

Prongs of gonapods very unequal; dorsum moderately convex, the carinæ inserted above the middle line of side.

Posterior (lateral) branch of gonapod long, strongly curved, terete, tapering to a slender point; posterior corners of carinæ rounded.

Genus *Hybaphe*.

Posterior branch of gonapod falcate, the apex broad and flattened; posterior corners of carinæ distinctly angled.

Genus *Harpaphe*.

Chonaphe gen. nov.

Type.—*Chonaphe armata* (Harger) from Oregon, Washington, and Idaho.

Body rather small and slender; dorsum moderately convex; carinæ inserted higher up and less thickened on the margin than in related Western genera.

Antennæ filiform, longer than the body is wide; legs also long and slender in comparison with those of related genera.

Gonapods much longer than in allied forms, the laminate-cristate anterior branch much larger than the slender and strongly incurved posterior branch.

CHONAPHE ARMATA (Harger).

(Pl. IV, figs. 2a, 2b, 2c.)

Polydesmus armatus HARGER, Am. Jour. Sci. and Arts, IV, p. 120, July 13, 1872.

Leptodesmus armatus BOLLMAN, Bull. 46, U. S. Nat. Mus., p. 122, 1893.

A specimen apparently referable to this species is included in a collection of Washington Myriapoda.¹ In addition to the characteristic gonapods there are other conspicuous differences. In habit it is a slender, long-legged animal. The dorsal convexity is moderately strong, but the carinæ are inserted higher up and are thinner than in the related Western genera. The color of the alcoholic specimen is a uniform dull purplish. It measures about 30 mm. by 4.5 mm.; antennæ 5 mm.; leg 4.2 mm. Harger's measurement is 28 mm. His specimens were States in the very flat dorsum, the thinner margins of the carinæ, and the very small last segment. The habit is also characteristic, the carinæ being nearly as continuous as in the *Xystodesmidæ*. The femora are unarmed.

¹Through the kindness of Prof. C. V. Piper, of Pullman, Washington, I have recently received a small but very interesting collection of Myriapoda.

from the John Day Valley, Oregon, and are described as having the carinæ and last segment yellow.

CHONAPHE ERUCA (Wood).

Polydesmus eruca WOOD, Proc. Acad. Nat. Sci. Phila., p. 8, 1864; Trans. Am. Phil. Soc., XIII, p. 227, 1865.

Strongylosoma eruca BOLLMAN, Bull. 46, U. S. Nat. Mus., p. 122, 1893.

The generic position of this species can not be determined with confidence, but there need be no doubt that it belongs with the present series of American genera, rather than with the European genus *Strongylosoma* Brandt. This disposes of a long-standing anomaly of distribution, since no other species of *Strongylosoma*, nor anything related to it, is known from North America. The present species is assigned to the genus *Chonaphe* on the basis of three female specimens collected by Prof. C. V. Piper at Pullman, Washington, which may prove to be females of *Chonaphe armata*, though they are distinctly more robust and convex, and with the carinæ proportionally much smaller than the females of other species of the related genera. They agree fairly well with Wood's description, except in color, which is very pale grayish, slightly tinged with brownish in one individual. Wood's specimens were also all females, and as they, as well as the type of Harger's species, were from Oregon, the presumption of specific identity is somewhat strengthened, though the degree of sexual dimorphism which this would imply is rather unusual among the Diplopoda.

Isaphe gen. nov.

Type.—*Isaphe convexa*, from Idaho.

Antennæ subfiliform; joints 2 to 5 equal, joint 6 slightly longer and thicker than the others; olfactory cones 4.

First segment semielliptic, nearly as broad as the second, about twice as wide as long.

Lateral carinæ rather narrower than in related genera; posterior corner rounded, produced only on a few posterior segments.

Repugnatorial pores sublateral, opening in small pits of the outer slope of the strongly thickened margins of the carinæ; pore formula normal.

Gonapods with basal joint moderately prominent; second joint with a somewhat bulbous base on which are inserted two long, slender, tapering prongs nearly equal in length and size, and strongly connivent at the apex.

The dorsal convexity is notably greater than in other West Ameri-

can genera. The much rounded carinæ suggest those of *Hybaphe curtipes*, but the gonapods are so unlike as to forbid the inference of close relationship. Females have the carinæ still further reduced.

ISAPHE CONVEXA sp. nov.

(Pl. IV, figs. 1a, 1b.)

Type.—No. 788, U. S. Nat. Mus. Collected by John B. Leiberg in Kootenai County, Idaho, August, 1890.

Length of male about 30 mm.; width 5.3 mm.; length of antenna 4.3 mm.; of leg 4 mm.

Color in alcohol brown, darkest across the middle of the segment; carinæ yellowish, also a transverse band occupying the middle third of the posterior margin of each segment. The lighter area is larger and less distinctly defined on posterior segments.

Surface of segments smooth and shining.

Gonapods with extremely long bristles arising from the basal portion of the second joint. The prongs are of nearly equal length, the anterior being somewhat more slender, and having a double curve near the base, while the other is simply arcuate.

A male and two female specimens were collected by Mr. Leiberg.

Hybaphe gen. nov.

Type.—*Hybaphe tersa*, from State of Washington.

Related to *Isaphe* and to *Harpaphe*; from the former it differs in the less convex dorsum and in the very small and spine-like anterior ramus of the gonapod. The posterior branch is much longer and is much more curved than in *Isaphe*.

From *Harpaphe* the present genus is distinct in the strongly rounded posterior corners of the carinæ, and in the long, strongly decurved, subterete gonapods.

HYBAPHE TERSA sp. nov.

(Pl. IV, fig. 3a.)

Type.—No. 789, U. S. Nat. Mus. Collected by C. V. Piper at Almota, Washington.

Length of male 37 mm.; width 6 mm.; length of antenna 5.3 mm.; length of leg from middle of body 5.5 mm., with claw 6 mm.

Color of alcoholic specimen dark grayish-brown; carinæ yellowish; legs very dull reddish; antennæ much darker reddish, except at the yellowish articulations.

The yellow areas of the carinæ are narrower than in *H. curtipes*, especially in the middle and front of the segment; the dark color of the posterior margin is also more distinct than in that species.

HYBAPHE CURTIPES sp. nov.

Type.—No. 790, U. S. Nat. Mus. Collected at Pullman, Washington, by C. V. Piper.

Length of male about 33 mm.; width 5 mm.; length of leg without claw 4.4 mm.; with claw 4.6 mm.; length of female about 36 mm.; width 5.7 mm.; length of leg of female 5 mm.; claw .3 mm.

Color in alcohol grayish or greenish-brown, more or less marbled; carinæ yellow, the yellow area larger and apparently brighter colored than in *H. tersa*.

The small and weak legs of the male of this species are, perhaps, the most conspicuous difference between it and *H. tersa*. Additional diagnostic features are to be found in the small size of the body, the more convex dorsum, the narrower and more rounded carinæ, with a larger yellow area. The reduction of the carinæ becomes particularly noticeable on the posterior segments, only a few of which have the corners produced, and that but slightly, in comparison with the large projecting angles of *H. tersa*. The thickened margin of the carinæ, on the other hand, is more pronounced in the present species, and the poriferous cavity is larger; in other words, the body characters which separate *Hybaphe tersa* from *Harpaphe haydeniana* are accentuated in *Hybaphe curtipes*.

Harpaphe gen. nov.

Type.—*Harpaphe haydeniana* (Harger) from Oregon.

Closely related to the two preceding genera, but of larger size and more robust habit. The posterior angles of the carinæ, instead of being rounded, are distinctly produced, and the slender, terete, posterior ramus of the gonapods of *Isaphe* and *Hybaphe* is replaced in *Harpaphe* by a very short, robust, flattened and blade-like armature, to which the generic name alludes. Whether the generic is too high a rank to assign to these groups of species can only be determined at a considerably more advanced stage of the study of the Diplopoda of the Northwest.

HARPAPHE HAYDENIANA (Wood).

(Pl. IV, figs. 4a, 4b, 4c.)

Polydesmus haydenianus WOOD, Proc. Phila. Acad. Sci., p. 10, 1864; Trans. Am. Phil. Soc., XIII, p. 226, 1865.

Leptodesmus haydenianus BOLLMAN, Bull. 46, U. S. Nat. Mus., p. 122, 1893.

Type collected in Oregon, apparently by the Hayden Expedition. The specimen is probably no longer in existence; many of the Myriapods studied by Wood were destroyed by fire in the Smithsonian Institution.

This species was secured by the Harriman Expedition at Lowe Inlet, B. C. For comparison the U. S. National Museum has a specimen from Portland, Oregon, and several from Comox Lake, Vancouver Island, the male from which the figures were drawn being from this locality. In addition to the notes given below with *H. intaminata*, it may be said that the dorsum of what is taken to be the true *Polydesmus haydeniana* is somewhat less convex, much more distinctly rugulose, and of a more distinctly brown color than that of the California specimens. The last segment is abruptly narrowed below the very narrow subcylindric apex, which is tipped with brown. The sides of this segment and the adjacent parts of the anal valves are yellowish. No differences in the gonapods were detected, and it seems strange that nobody has suggested the reduction of *intaminata* as a synonym of *haydeniana*.

A female specimen collected by Mr. A. D. Hopkins in June, 1902, in a dense forest of the Olympic Mountains (No. 1062), is nearly black in color, with the yellow areas of the carinæ smaller than usual and the corners of the posterior carinæ somewhat more produced. The last segment is slightly constricted just below the truncate apex, and has a slight prominence on each side above the constriction; the tip is dark brown.

HARPAPHE INTAMINATA (Karsch).

Polydesmus (Oxyurus) intaminatus KARSCH, Troschel's Archiv f. Naturg., XLVII, p. 41, 1881.

Leptodesmus intaminatus ATTEMS, Denkschr. Kais. Acad. Wien., LXVII, p. 387, pl. vi, fig. 135, 1898.

Type in the Berlin Museum; from California.

This species may easily prove to be a synonym of *H. haydeniana*, but from the material studied it appears that California representatives of this genus differ from Oregon specimens in having the dorsal surfaces smooth and shining, instead of distinctly coriaceous. The yellow areas of the carinæ are also somewhat larger and more brightly colored. The last segment is shorter and not produced at apex; in color the apex is yellow throughout, but the sides and anal valves are dark.

Neither Wood nor Karsch gives definite localities. Attems studied specimens from Sisson, at the base of Mount Shasta, in northern California, and also examined Karsch's type, though he does not say that

his description and figure were based upon it. Karsch gives a measurement of 30 mm. and Attems 34-36 mm. by 5.5 mm.; but the U. S. National Museum has California specimens 38 mm. by 6 mm., collected by Ehrhorn at Mountain View.

Family POLYDESMIDÆ.

It was formerly customary to refer to this family all the members of the order Merocheta, but as now limited it consists largely of temperate forms of rather small size, the more intimate relatives of the circumpolar genus *Polydesmus*.

ANALYTICAL KEY TO THE NORTHWEST AMERICAN GENERA OF POLYDESMIDÆ.

Body composed of nineteen segments; dorsum convex, rough with several transverse rows of conic granules.....Genus *Scytonotus*.
Body with twenty segments; dorsum nearly flat, ornamented with three rows of convex areas.....Genus *Polydesmus*.

Genus *Scytonotus* C. L. Koch.

Scytonotus C. L. KOCH, System der Myriapoden, p. 130, 1847.

Young and female specimens of a *Scytonotus* were collected by the Harriman Expedition at Yakutat Bay, Sitka, and Juneau, but without adult males their relationship to the eastern *Scytonotus granulatus* can not be determined. The figures of *Scytonotus* shown in plate III were made from a specimen from the Northwest, in the belief that it was a new species. Subsequently the vial was misplaced, so that the preparation of a comparative description must be deferred.

Genus *Polydesmus* Latreille.

Polydesmus LATREILLE, Hist. Nat. des Crust. et d. Ins., III, p. 44, 1802, and VII, p. 77, 1804.

It is to be expected that *Polydesmus* will be found in Alaska, but in the forest region of the southern part, rather than upon the coasts and islands visited by the Harriman Expedition.

POLYDESMUS CERASINUS Wood.

Polydesmus cerasinus WOOD, Proc. Phila. Acad. Sci., 1864, p. 6; Trans. Amer. Phil. Soc., XIII, p. 217, 1865.

This species was described from Oregon, and specimens apparently referable to it are included in the collection sent by Prof. C. V. Piper, from the State of Washington.

Order Colobognatha.

The order Colobognatha contains a small series of peculiar Diplopoda, very different, even in external appearance, from other members of the class. The segments are very short, compact, and numerous. The body is also distinctly flattened, and the projecting sides conceal the legs, so that the Colobognatha are particularly liable to be overlooked as worms, grubs, or slugs.

Family POLYZONIIDÆ.

There are several tropical families of Colobognatha, but the Polyzoniidæ are a north-temperate group common to both hemispheres. The complete distinctness of the Diplopod faunas of the two sides of North America is strikingly exemplified by the fact that while the Eastern *Polyzonium rosalbum* is closely similar to the European *P. germanicum*, there is a new and very distinct genus in the State of Washington to which the attention of collectors in the Northwest should be directed.

ANALYTICAL KEY TO THE GENERA OF POLYZONIIDÆ.

Segments strongly depressed, the dorsum nearly horizontal; head broadly rounded; segments 20.....Genus *Platyzonium*.

Segments strongly convex; head conical; segments 30 to 50.

Last segment covered and exceeded by the large, broadly rounded, penultimate segment; segments 30.....Genus *Hypozoneum*.

Last segment exposed and projecting beyond the distinctly emarginate posterior edge of the penultimate; segments variable in number, adults commonly with 40 to 50Genus *Polyzonium*.

Hypozoneum gen. nov.

The new member of the Polyzoniidæ suggests the European *Platyzonium getschmannii* (Zool. Anzeiger, No. 488, p. 426, 1895), rather than *Polyzonium*. The body is more convex than in *Platyzonium*, though much less so than in *Polyzonium*. The body cavity is nearly semicircular in *Polyzonium*, and about twice as wide as high, but in *Hypozoneum* it is over three times as wide as high, and has the outer corners very narrow. The lateral angles can scarcely be called carinæ in the present family, since they are not projections from the sides of cylindrical segments, as in the Merocheta and Cœlocheta, but are a direct result of the dorsoventral compression of the body. Among the Merocheta the power of rolling up spirally depends largely upon the

shortness of the interlocking parts of the segments, but the segments of the Polyzoniidæ are already extremely short, and the relative flexibility of the body in the vertical plane is evidently greater in *Hypozonium* than in the much thicker *Polyzonium*.

An even more striking difference between *Polyzonium* and *Hypozonium* exists in the fact that the last segment, which in *Polyzonium* is distinctly visible from above as a narrow projection, is in *Hypozonium* entirely concealed and greatly exceeded by the large trapezoidal penultimate segment. In *Polyzonium* the penultimate segment is slightly longer, and of the same shape as the others, but in *Hypozonium* it is over three times the normal length, and is not emarginate behind, but broadly rounded. The last segment is very minute and is concealed in a recess between the oblique and rather prominent pleuræ of the penultimate segment.

HYPOZONIUM ANURUM sp. nov.

(Pl. v, figs. 1a-1d.)

Type.—No. 791, U. S. Nat. Museum. Collected at Seattle, Washington, by C. V. Piper.

Length about 7 mm.; width 2.5 mm.; 30 segments.

Color in alcohol a deep brownish-orange, closer examination shows that the tint is not uniform, but is darker and somewhat mottled on the posterior subsegments.

The antennæ are dark, with a purplish tinge. In form they are extremely robust, more so than in *Polyzonium*, and much more so than in *Platyzonium*. The joints are more unequal in size than in *Polyzonium*; basal joint short, the sixth much the largest, and the seventh reduced to a stopper-like disk which fits into the end of the sixth and is not visible from the side.

Eye-spots farther apart than in *Polyzonium*; ocelli three on each side, in a somewhat obliquely vertical row, the upper farther apart than the lower, but not in a direction so divergent as those of *Polyzonium*. The upper ocellus is concealed under the margin of the first segment.

The lateral margins and posterior corners of the segments are much more prominent and rounded than in *Polyzonium*, where the sides of the body are a nearly even, continuous line.

Order Anocheta.

Cylindrical Diplopoda, mostly of large size. They differ from all except the Colobognatha in having legs on all the anterior segments,

in having one pair instead of two on segment 5. From the Colobognatha they are distinct in the cylindrical body, with completely hardened segmental rings, in having the mouth-parts well developed and adapted for chewing, and in having the anterior pair of legs of segment 7 modified into gonapods, instead of having eight normal legs in front of the gonapods, as in the Colobognatha.

The large cylindrical Myriapods so common in tropical countries belong to two distinct series formerly treated as constituting two colossal related genera, *Spirobolus* and *Spirostreptus*, but now recognized as having little in common, and assigned to the separate orders, Anocheta and Diplocheta. Only the former extends into temperate regions, and this only in North America and eastern Asia. And since the Chinese Anocheta are very similar to those of temperate North America, and may have been derived from them, the absence of temperate Anocheta from other parts of the Old World, and the relatively great abundance and diversity of the Anocheta of the American tropics in comparison with those of the Old World, may be taken as indications of an American origin for the order as a whole, though its cosmopolitan distribution must have been attained at a very remote period.

Family SPIROBOLIDÆ.

The Anocheta are not separated into families, but there are numerous genera, and those of temperate North America are distinct from the tropical genus *Spirobolus*, in which they have thus far been included.

ANALYTICAL KEY TO THE NORTH AMERICAN GENERA OF SPIROBOLIDÆ.

Anal valves strongly inflated and evenly convex, the margins not prominent; second segment not projecting below the lateral corners of the first; males with claws of anterior legs as long as the distal joint.....Genus *Onychelus*.

Anal valves with prominent thickened margins; second segment with a prominent angle directed downward and forward beyond the lateral corners of the first segment; males with claws of anterior legs not hypertrophied.

Body slender, over ten times as long as broad; legs long, projecting beyond the sides of the body; anterior legs of male with third joint much larger than the second, on pairs 4 to 7 strongly compressed and with a thin ventral edge.....Genus *Arctobolus*.¹

¹A new genus, based on *Arctobolus onondaga* sp. nov. The type, collected at Kirkville, Onondaga County, New York, in June, 1895, is 65 mm. long by 5.3

Body robust, less than eight times as long as broad; legs short, entirely concealed by the body from above; anterior legs of male with third joint normal and shorter than the second.

Genus *Tylobolus*.

Tylobolus gen. nov.

Type.—*Tylobolus deses* sp. nov., from California.

Antennæ accommodated by a deep excavation in the head and mandibular stipe; not concealed under the first segment.

First segment scarcely emarginate on each side in front to accommodate the prominent posterior corner of the head.

Second segment below on each side with a thick oblique ventral ridge or keel enlarged in front into a rounded process projecting below the corner of the first segment as a stout rounded corner.

Segments with a very slight transverse constriction, the posterior subsegment scarcely thicker or more convex than the anterior; repugnatorial pores located in the constriction; posterior subsegments with a short and indistinct longitudinal groove behind the pore.

Anal valves prominent and swollen near the margins.

Males with coxa of the third leg produced into a large hook, directed forward; coxa of fourth leg prominent, the others scarcely so.

Gonapods with ventral plate broadly triangular or rounded; anterior lobes blunt, tuberculate on the anterior face mesad. Posterior gonapods rather simple, strongly curved, ending in a cylindrical pilose spine. The ventral rim of the seventh segment is low, as in *Arctobolus*.

TYLOBOLUS DESES sp. nov.

(Pl. III, figs. 3a-3h.)

Type.—No. 796, U. S. Nat. Mus. Collected in California by Mr. Carl F. Baker.

Related to *Tylobolus hebes* (Bollman), but the body smaller, less robust, and more gradually narrowed caudad, and the apex of the posterior gonapods slender.

Length of males about 40 mm.; width 5 to 5.5 mm.; length of females 45 to 50 mm.; diameter 6 to 6.5. Segments 44 to 46.

mm. broad, with 55 segments. Color very dark, dull green, the posterior margins of the segments banded with dull red; legs uniform deep red. The first two pairs of legs are strongly crassate in the male and the coxæ of pairs 3 to 7 are produced ventrad, but lack the larger hooked processes found in *Tylobolus*. The present species is abundant in favorable locations in central New York. It differs from the more southern *Arctobolus marginatus* (Say) in the smaller size, more slender body, more uniform and darker color, and in the more distinct punctuation of the surface of the segments. The basal joint of the gonapod is sinuate or emarginate laterad, instead of evenly convex as in *A. marginatus*.

Color walnut to mars brown and seal brown; posterior margins of segments in some specimens darker and in others lighter; legs somewhat paler than body, but of the same color. Young specimens with a slight reddish or pinkish tinge.

Clypeus usually with four setiferous punctations on each side; often with five, rarely with three, and in such instances the numbers of the two sides generally unequal.

First segment with lateral corners sharper and more produced than in *T. hebes*, so that the processes of the second segment appear somewhat shorter than in that species.

Segments with transverse and other sutures less distinct than in *T. hebes*, but the surface somewhat more distinctly punctate and with very minute and irregular furrows and striæ. The coarser longitudinal or oblique striations of the ventral surface of the segments cease well below the pores, especially caudad. The posterior transverse suture curves backward to pass around the pore.

The posterior part of the body tapers more than in *T. hebes*, though less in some individuals than in others, since two or three of the rear segments are sometimes much shortened or compacted together.

Anal valves rather more prominent, thick, and swollen than in *T. hebes*.

Gonapods differing from those of *T. hebes*, as described by Bollman, in having the mesial part of the anterior lobe shorter than the ventral plate, and the apex of the posterior lobe turned outward. The posterior gonapod differs also in that the apex is long, subcylindric, and pilose, instead of "small, thick, and rounded, beneath produced into two serrated plates."

Fifteen specimens were examined, nine of which are mature males. They were probably collected in the vicinity of Palo Alto, though the vials contain no indications of locality, other than 'California.' A single female nearly 70 mm. long and 8 mm. wide may represent a distinct species, though closely resembling the others, except in the much greater size.

TYLOBOLUS HEBES Bollman.

Spirobolus hebes BOLLMAN, Entomologica Americana, II, p. 228, 1887; Ann. N. Y. Acad. Sci., IV, p. 31, 1887; Bull. 46, U. S. Nat. Mus., pp. 50, 65, 1893.

This species belongs undoubtedly to the present genus, and seems to be very closely allied to the preceding. The National Museum seems to possess only the female of the original pair described by

Bollman. This animal is peculiar in the unusually great accentuation of the sutures of the segments, which are marked by grooves visible to the naked eye.

TYLOBOLUS UNCIGERUS (Wood).

Spirobolus uncigerus Wood, Proc. Phila. Acad. Sci., p. 15, 1864; Trans. Am. Phil. Soc., XIII, p. 209, 1865.—BOLLMAN, Bull. 46, U. S. Nat. Mus., p. 49, 1893.

The specimens studied by Bollman are in the National Museum, and belong to this genus. As a species, *T. uncigerus* is more slender than the two preceding, and may also be separated by the characters of the gonapods as shown in Wood's figure. The apex of the ventral plate and the corners of the anterior lobes are much more angular than in *T. deses*.

A young female specimen in the National Museum collected by S. C. Brown at Corvallis, Oregon, evidently belongs to *Tylobolus*, and is more similar to *T. uncigerus* than to the other species.

Onychelus gen. nov.

Type.—*Onychelus obustus* sp. nov.

Antennæ accommodated by a shallow excavation of the head and mandibular stipe; not concealed under the first segment.

First segment distinctly emarginate on each side in front, to accommodate the very prominent posterior corners of the head.

Second segment without ventral processes.

Segments with a distinct transverse constriction, the posterior subsegment distinctly thicker and more convex than the anterior; repugnatorial pores located in front of the constriction; pores followed on posterior subsegments by a very distinct longitudinal sulcus.

Anal valves strongly inflated, evenly convex, not more prominent near the margins as in *Tylobolus*, not greatly exceeding the short, broadly rounded apex of the last segment.

Anterior legs of male with claws very large, as long as the distal joint; first two pairs strongly crassate; legs 3 to 7 with coxæ only slightly produced; second joints with a rounded prominence below distad; other joints normal.

Gonapods with ventral plate produced into a rather narrow tongue nearly as long as the anterior lobes; posterior gonapods slender, simple. Seventh segment with a transverse ventral crest.

ONYCHELUS OBUSTUS sp. nov.

Type.—No. 797, U. S. Nat. Mus. Collected in the Colorado desert by C. R. Orcutt.

Length of male 38 mm., width 3.8 mm.; female 39 mm. by 4.2 mm.

Colors in alcohol black and dull yellow or clay-color. Segments in front of posterior suture dull black to below the pores; posterior zone reddish above, the ventral surface, legs, and antennæ clay-color.

Clypeal foveolæ five on each side; some distance above the foveola two oblique rows of small irregular depressions, the rows converging upward.

First segment with a very distinctly raised anterior margin extending from the lateral corners to near the eyes where the limiting groove bends inward and is suddenly obliterated. The edge is concave along the raised margin, to accommodate the inflated angle of the head, and the lateral corner is rather pointed.

Segments nearly smooth above; in front of the constriction they are quite even, but the black surface does not shine. Behind they are abruptly thicker and distinctly convex; the surface shines, though it is less even, being marked by indistinct and irregular longitudinal shallow grooves or depressions. The suture of the median line is marked by a fine sulcus, and that behind the pore is deep and distinct. The longitudinal grooves become more distinct below the pores, and pass gradually into the normal strictions more than half way down to the legs. Pleural sutures distinct, but less so than the others. The surface of the anterior part of each segment below is ornamented with a delicate network which takes the place of the concentric striations.

Last segment very broadly and evenly rounded, the surface inflated and convex, both above and on the sides. Anal valves evenly convex, polished, and shining.

Gonapods with ventral plate and mesial corners of anterior lobes much produced; lateral lobes broadly triangular, the short apex turned outward; posterior gonapods concealed, slender, simple, falcate.

Numerous specimens of both sexes have been examined. They are entangled with numerous cactus spines, indicating an intimate association with these plants.

Order Cœlocheta.

The Cœlocheta are a distinctly temperate and boreal group, and are probably represented by several species in Alaska. The creatures are small and unusually agile, and are poorly represented in collections. This applies especially to the suborder Chordeumatoidea, many of

which are natives of alpine districts of limited area. Thus far but two species of this group are known from the northwestern region — *Conotyla atrolineata* (Bollman), from Alaska, and *C. glomerata* (Harger), from Oregon.

Genus *Conotyla* Cook & Collins.

Conotyla COOK & COLLINS, Ann. New York Acad. Sci., IX, p. 70, 1895.

CONOTYLA ATROLINEATA (Bollman).

Craspedosoma atrolineatum BOLLMAN, Proc. U. S. Nat. Mus., x, p. 618, 1887; Bull. 46, U. S. Nat. Mus., pp. 35, 183, 1893.

Conotyla atrolineata COOK & COLLINS, Ann. New York Acad. Sci., IX, p. 75, 1895.

The type of this species was collected at Glacier Bay, Alaska.

CONOTYLA GLOMERATA (Harger).

Trichopetalum glomeratum HARGER, Amer. Jour. Sci. and Arts, IV, p. 118, 1872.

Craspedosoma glomeratum BOLLMAN, Proc. U. S. Nat. Mus., x, p. 619, 1887; Bull. 46, U. S. Nat. Mus., pp. 36, 120, 1893.

Conotyla glomerata COOK & COLLINS, Ann. New York Acad. Sci., IX, p. 78, 1895.

“A single specimen of this species was collected by the writer in the valley of the John Day River, Oregon, in October, 1871” (Harger).

Order Zygocheta.

Diplopoda with 30 segments and upward, the ventral plates generally adnate to but never coalesced with the dorsal part of the exoskeleton. Seminal apertures located in a pair of adnate external ducts inserted below the second pair of legs. The gnathochilarium has the stripes in contact between the mentum and promentum.

The north-temperate order Zygocheta has superficial similarity to the tropical Anocheta and Diplocheta, but nearly all the details of structural specialization are different.

There are three families of Zygocheta in eastern North America, the Isobatidæ, the true Julidæ, and the Parajulidæ, but only the last is known from the Northwest.

Family PARAJULIDÆ.

First pair of legs of male strongly hypertrophied and crassate, the second pair atrophied; gonapods exerted. In the true Julidæ of Europe and eastern North America the males have the first pair of legs atrophied and the gonapods are entirely concealed within the body cavity.

The Parajulidæ are a distinctively American group, though not without representatives in eastern Asia.¹ The true Julidæ, though having their headquarters in Europe, are cosmopolitan in the north-temperate zone; that no relative of *Parajulus* has reached Europe seems to indicate that these are a more recent group than the true Julidæ, or that their opportunities of distribution have been more limited. The fact that *Parajulus* was originally described from Mexico is perhaps a reason why it has been considered less boreal, as it were, than the Julidæ, though the greatest development of the Parajulidæ occurs in the United States. The finding of a member of this family in Alaska not only greatly extends the known distribution of the group, but also ranges it as a boreal if not a circumpolar type, since it is already known from the Hudson Bay region of British America.

Genus *Parajulus* Humbert & Saussure.

Parajulus HUMBERT & SAUSSURE, Rev. et Mag. Zool., p. 155, 1869.

PARAJULUS ALASKANUS sp. nov.

(Pl. v, figs. 4a-4k.)

Type.—No. 792, U. S. Nat. Mus. Collected at Metlakatla, Alaska, June, 1899, by the Harriman Expedition.

Length about 30 mm.; width 1.5 mm.; segments 43 to 48.

Color very dark brown or black, nearly uniform throughout, though sometimes mottled with grayish or pinkish in young or recently moulted specimens.

The gonapods show that this is allied, though not very closely, to *Parajulus furcifer* (*Julus furcifer* Harger), but in this the columnar lateral parts are apparently longer and more slender, while the prongs of the inner ramus of Harger's figure are lacking. The color of the animal as a whole is also very much darker than indicated in Harger's description.

In addition to the type, this species was obtained by the Harriman Expedition at Juneau, Sitka, and Yakutat Bay.

PARAJULUS FURCIFER (Harger).

(Pl. v, figs. 5a-5e.)

Julus furcifer HARGER, Jour. Sci. and Arts, IV, p. 119, 1872.

Harger's original specimens were collected in the John Day Valley,

¹A *Parajulus* has been described by Mr. Pocock from southeastern Corea. (*Parajulus coreanus* Pocock, Ann. and Mag. Nat. Hist., ser. 6, xv, p. 365, pl. XI, f. 12, 12a, 1895.)

Oregon, October, 1871; those represented in our figures at Corvallis, Oregon, November, 1895, by S. C. Brown.

Class CHILOPODA.

As a group the Chilopoda are less distinctively tropical than the Diplopoda. They are all carnivorous animals, of active habits, and the genera and species have a very wide distribution. They are more tenacious of life than the Diplopoda, and several species have already become cosmopolitan through human agency. They are thus of distinctly less interest from the standpoint of distributional studies.

ANALYTICAL KEY TO THE ORDERS OF CHILOPODA.

Spiracles in a single series, located in the dorsal median line; tarsi long and whip-like, composed of very numerous small joints.

Order SCHIZOTARSI.

Spiracles in two lateral series; tarsi few-jointed.

Body hatched with 7 pairs of legs, with 15 pairs when mature.

Order ANAMORPHA.

Body hatched with its full complement of 21 or more pairs of legs.

Order EPIMORPHA.

Order Schizotarsi.

The Schizotarsi include the single genus *Scutigera*, the members of which are all normally tropical or subtropical, though one species, *Scutigera forceps*, has established itself widely in the continuously warm buildings of American cities, doubtless including those of the Northwest. The strangely elongated, many-jointed tarsi are very dextrously employed in catching and holding the flies and perhaps other insects on which *Scutigera* feeds.

Order Anamorpha.

This order consists principally of the large temperate genus *Lithobius*, many species of which have been found in high latitudes in Europe, Siberia, and North America.

Family LITHOBIIDÆ.

Genus *Lithobius* Leach.

Lithobius LEACH, Trans. Linn. Soc. London, xi, pt. 2, p. 381, 1815.

LITHOBIUS STEJNEGERI Bollman.

Lithobius stejnegeri BOLLMAN, Bull. 46, U. S. Nat. Mus., p. 199, 1893.

Bering Island, July-August, 1897 (Dr. Stejneger, Mr. Barrett-Hamilton); Copper Island, August, 1897 (Mr. Barrett-Hamilton).

This species belongs to the subgenus *Archilithobius*, and seems to have not very distant relatives among several species described from Siberia by Stuxberg. This larger suite of specimens shows considerable variation in color, some individuals being quite deep purplish-red, while others are rather light brownish. Females of both colors were examined, and the shape of the genital forceps seemed to be identical.

LITHOBIUS SULCIPES Stuxberg.

Lithobius sulcipes STUXBERG, Öfv. vet. Akad. förh., 21, 1876.—BOLLMAN, Bull. 46, U. S. Nat. Mus., p. 199, 1893.

Bering Island. Taken in 1883 by Dr. Stejneger.

Order Epimorpha.

ANALYTICAL KEY TO THE SUBORDERS OF EPIMORPHA.

Segments 21 or 23; not all provided with spiracles.

Suborder SCOLOPENDROIDEA.

Segments 31 and upward; spiracles in a continuous series.

Suborder GEOPHILOIDEA.

Suborder SCOLOPENDROIDEA.

The more conspicuous representatives of this group are the large tropical centipedes, but there are numerous genera of small Scolopendroidea, some of which are native in temperate regions. The genus *Cryptops* is widely distributed in both hemispheres, and will probably be found in the Northwest.

Family SCOLOPOCRYPTOPIDÆ.

Genus *Otocryptops* Haase.

Otocryptops HAASE, Abh. Ber. Zööl. Anthropol. Mus. Dresden, No. 5, p. 96, 1887.

This genus was separated from *Scolopocryptops* Newport because of the absence of spiracles from the seventh segment. The type is *O. rubiginosa* (L. Koch), a native of China and Japan not remotely related to the following widespread North American species. Haase looked upon *Otocryptops* as a distinctively Asiatic genus, but it seems rather to have originated in America, where other species of *Otocryptops* and all the related 23-segmented Chilopoda are found. Of the latter there

are three genera, *Scolopocryptops*, *Newportia*, and *Scolopendrides*, all confined to the tropics.

OTOCRYPTOPS SEXSPINOSUS (Say) Pocock.

Cryptops sexspinosa SAY, Jour. Phila. Acad., II, p. 112, 1821.

Scolopocryptops 6-spinosa NEWPORT, Linn. Trans., p. 407; Cat. Myr. Brit. Mus., p. 57, 1856.

Scolopocryptops sexspinus MEINERT, Proc. Amer. Phil. Soc., p. 179, 1886; Myr. Mus. Haun., III, p. 14, 1886.—BOLLMAN, Bull. 46, U. S. Nat. Mus., p. 177, 1893.

Otocryptops punctatus POCKOCK, Ann. and Mag. Nat. Hist., 6, 8, VIII, p. 159, 1891.

Otocryptops sexspinus POCKOCK, Ann. and Mag. Nat. Hist., 6, xv, p. 351, 1895.

Suborder GEOPHILOIDEA.

ANALYTICAL KEY TO THE NORTHWEST AMERICAN FAMILIES OF GEOPHILOIDEA.

Body attenuated in front; cephalic lamina and the broad prebasal lamina covering the prehensorial legs.....Family LINOTÆNIIDÆ.

Body as broad or broader in front than behind; prehensorial legs partially exposed at the sides of the cephalic lamina.

Mandibles without dentate lamellæ.....Family GEOPHILIDÆ.

Mandibles with dentate lamellæ.....Family SCHENDYLIDÆ.

Family LINOTÆNIIDÆ.

A group confined, so far as known, to the temperate and arctic regions of the Northern Hemisphere. The New World species seem to be generically distinct from those of the Old World in details of mouth parts, but externally they are closely similar. The head is proportionally much smaller than in the other northern families of the Geophiloidea, giving the animals a habit more similar to the Mediterranean genus *Dignathodon* and to the tropical family Ballophilidæ, than to the Geophilidæ and the Schendylidæ.

Genus Tomotænia Cook.

Tomotania COOK, Am. Naturalist, XXIX, p. 866, 1895.

TOMOTÆNIA CHIONOPHILA (Wood).

Strigamia chionophila WOOD, Jour. Phila. Acad. Sci., v, p. 50, 1862; Trans. Am. Phil. Soc., XIII, p. 189, 1865.

Scolioplanes chionophilus MEINERT, Proc. Am. Phil. Soc., XXI, p. 223, 1885.

Linotania chionophila BOLLMAN, Bull. 46, U. S. Nat. Mus., p. 123, 1893.—
COOK, The Fur Seal and Fur-Seal Islands of the North Pacific Ocean,
pt. 4, 350, 1898.

Tomotania chionophila COOK, Am. Naturalist, xxix, p. 866, 1895.

The Harriman Expedition secured numerous specimens of this species at Popof Island, Sitka, Lowe Inlet, and at Karluk on Kadiak Island. It is apparently very common in some localities. The U. S. National Museum has two vials containing more than fifty specimens each from St. Paul Island, Pribilof Islands, and from Unalaska, collected by Professor Kincaid in 1897.

Dr. Leonhard Stejneger secured this species on Bering Island, and Mr. Barrett-Hamilton on Copper Island.

Among the numerous specimens of *Escaryus sibiricus* in the Hamburg Museum are a few individuals of this or a closely allied species collected at Vladivostock, Siberia, by Graeser. A female in this lot has 43 pairs of legs.

Family GEOPHILIDÆ.

ANALYTICAL KEY TO THE WEST AMERICAN GENERA OF GEOPHILIDÆ.

Cephalic lamina much longer than broad; prehensorial sternum without lateral sulci; sterna with three longitudinal impressed lines.

Genus *Mecistocephalus*.

Cephalic lamina but little broader than long; prehensorial sternum with lateral sulci; anterior sterna with deep, oval, median excavations.

Genus *Geophilus*.

Genus *Mecistocephalus* Newport.

Mecistocephalus NEWPORT, Proc. Zoöl. Soc. London, cxix, p. 178, 1842.—
COOK, Proc. U. S. Nat. Mus., xviii, p. 60, 1895.

A genus of circumpolar distribution. It is often treated merely as a very distinct species of *Geophilus*, but may prove not to be monotypic.

MECISTOCEPHALUS ATTENUATUS (Say).

Geophilus attenuatus SAY, Jour. Phila. Acad., II, p. 114, 1821.

Geophilus ferrugineus C. L. KOCH, Deutschl. Crust. Myr. u. Arach., heft III, 1835.

Pachymerium ferrugineum C. L. KOCH, System der Myriapoden, p. 187, 1847.

Mecistocephalus ferrugineus NEWPORT, Cat. Myr. Brit. Museum, p. 81, 1856.

Mecistocephalus attenuatus COOK, Proc. U. S. Nat. Mus., xviii, p. 60, 1895.

In size, color, and habit this species has a gross similarity to *Geophilus alaskanus*, described below, but detailed comparison will show many striking differences. The femur and claw of the prehensorial legs are armed with denticules, and the prehensorial sternum is without

lateral sulci. The cephalic lamina is long and narrow, and the basal lamina is also much narrower, being but twice as broad as long, instead of three times, as in *Geophilus*. The sterna lack the large median depressions, but are marked with three shallow longitudinal grooves.

The Harriman Expedition secured this species at Yakutat Bay; the U. S. National Museum has a specimen from St. Paul Island, Pribilof Islands, collected by T. Kincaid in 1897. The Yakutat Bay material consists of a mature female and several recently hatched young. The female has 47 pairs of legs.

Genus *Geophilus* Leach.

Geophilus LEACH, Linn. Trans., XI, p. 384, 1815.

A large genus of mostly temperate species, much in need of critical revision.

GEOPHILUS ALASKANUS sp. nov.

Type.—No. 793, U. S. Nat. Mus.; collected by the Harriman Expedition at Sitka, Alaska, June, 1899 (No. 47); a single specimen. Length about 30 mm.; width .75 mm.; male with 53 segments.

Color in alcohol rather dull orange brown.

Cephalic lamina oblong, somewhat longer than broad; frontal lamina completely coalesced; prebasal lamina not exposed; basal lamina broader than the cephalic.

Prehensorial sternum broader than long; lateral sulci distinct; prosternal teeth obsolete; coxæ unarmed; claw unarmed at base.

Dorsal surface naked and smooth, except for two very faint impressed lines.

Sterna, beginning with the second, with very deep oval median depressions, becoming shallow at the middle of the body and obsolete caudad.

Last sternum trapezoidal, slightly longer than broad, the lateral edges nearly straight and the posterior margin squarely truncate.

Pleuræ of last segment rather small, marked with 8 or 10 pigmented pores, of which the posterior one of the ventral face is larger than the others and is sunk in a deep cavity.

First pair of legs very small; last pair in male distinctly larger and more robust than the others, but scarcely crassate; armed with a claw of nearly normal size.

The deep color of this species suggests *Mecistocephalus attenuatus*, but the head is distinctly that of a *Geophilus*.

Family SCHENDYLIDÆ.

The Schendylidæ are a circumpolar family rather closely related to the true Geophilidæ, but apparently forming a distinct and rather compact group. The typical genus *Schendyla* is widely distributed in North America, as well as in Europe and North Africa. There is a second genus in the Mediterranean region, a third in West Africa, and a fourth in Madagascar. The American tropics have furnished as yet no representative of this family, though *Pectiniunguis* is known from the Florida Keys and from Lower California. In addition to that noticed below, there is a fourth American genus (*Holitys*) from the Organ Mountains of New Mexico.

ANALYTICAL KEY TO THE NORTH AMERICAN GENERA OF
SCHENDYLIDÆ.

Ventral pores wanting.....Genus *Escaryus*.

Ventral pores present, in a circular median area.

Anal legs armed with a normal claw Genus *Holitys*.

Claw of anal legs rudimentary or wanting.

Claw of maxillary palpus simple; mandibles with a single dentate lamella; last joint of anal legs much reduced.

Genus *Schendyla*.

Claw of maxillary palpus pectinate; mandibles with 3 dentate lamellæ; last joint of anal legs as long or longer than the penultimate.....Genus *Pectiniunguis*.

Genus **Escaryus** Cook & Collins.

Escaryus COOK & COLLINS, Proc. U. S. Nat. Mus., XIII, p. 391, 1890.

This genus was described originally from New York, but is probably distributed widely in eastern North America, and is also known to exist in northeastern Asia.¹ It differs from *Schendyla*, the only related genus of similar distribution, in having the last joint of the anal legs of normal size and armed with a claw, and in the absence of ventral pores.

ANALYTICAL KEY TO THE SPECIES OF ESCARYUS.

Females with 41 pairs of legs.....*E. urbicus* (Meinert).

Females with 45-51 pairs of legs.

Length 60 mm. and upward; claw of anal leg much smaller than the others *E. sibiricus* Cook.

¹ *Escaryus sibiricus* Cook, Proc. Ent. Soc. Washington, iv, p. 304, 1899.

Length less than 30 mm.; claw of anal legs of nearly normal size.

Last sternum nearly as broad as long, much narrowed behind;

pleural pores 5 or 6 on each side.....*E. albus* sp. nov.

Last sternum narrow, oblong, scarcely narrowed behind; pleural

pores about 17 on each side.....*E. liber* Cook & Collins.

ESCARYUS ALBUS sp. nov.

Type. — No. 794, U. S. Nat. Mus. Collected at St. Paul, Pribilof Islands, by T. Kincaid in 1897.

Size, habit, and color of *Schendyla nemorensis*, but with the last legs nearly normal and armed with a normal claw, the anal pores present and the pleural pores numerous.

Length 17 mm.; width .7 mm.; female with 45 pairs of legs.

Color waxy white, under the microscope delicate and subtransparent in texture.

Last sternum trapezoidal, about as broad as long, but much narrower behind than in front; pleural pores 5 or 6 on each side, differing somewhat in size, and placed without regularity.

Legs short and subconic; the last pair six-jointed and armed with a claw of normal shape and nearly normal size; they are somewhat larger than the others, but are not crassate.

Two specimens were found in vials with large numbers of *Tomotania chionophila*. The animals may be young, but the resemblance to adults of *Schendyla nemorensis* is very striking, and on geographical grounds the probability of distinctness from eastern species is great. The Siberian species from Vladivostock is large, deeply colored, and robust, measuring 60 mm. and upward in length, and the females have 49 or 51 pairs of legs.

PLATE III.

Xystocheir obtusa.

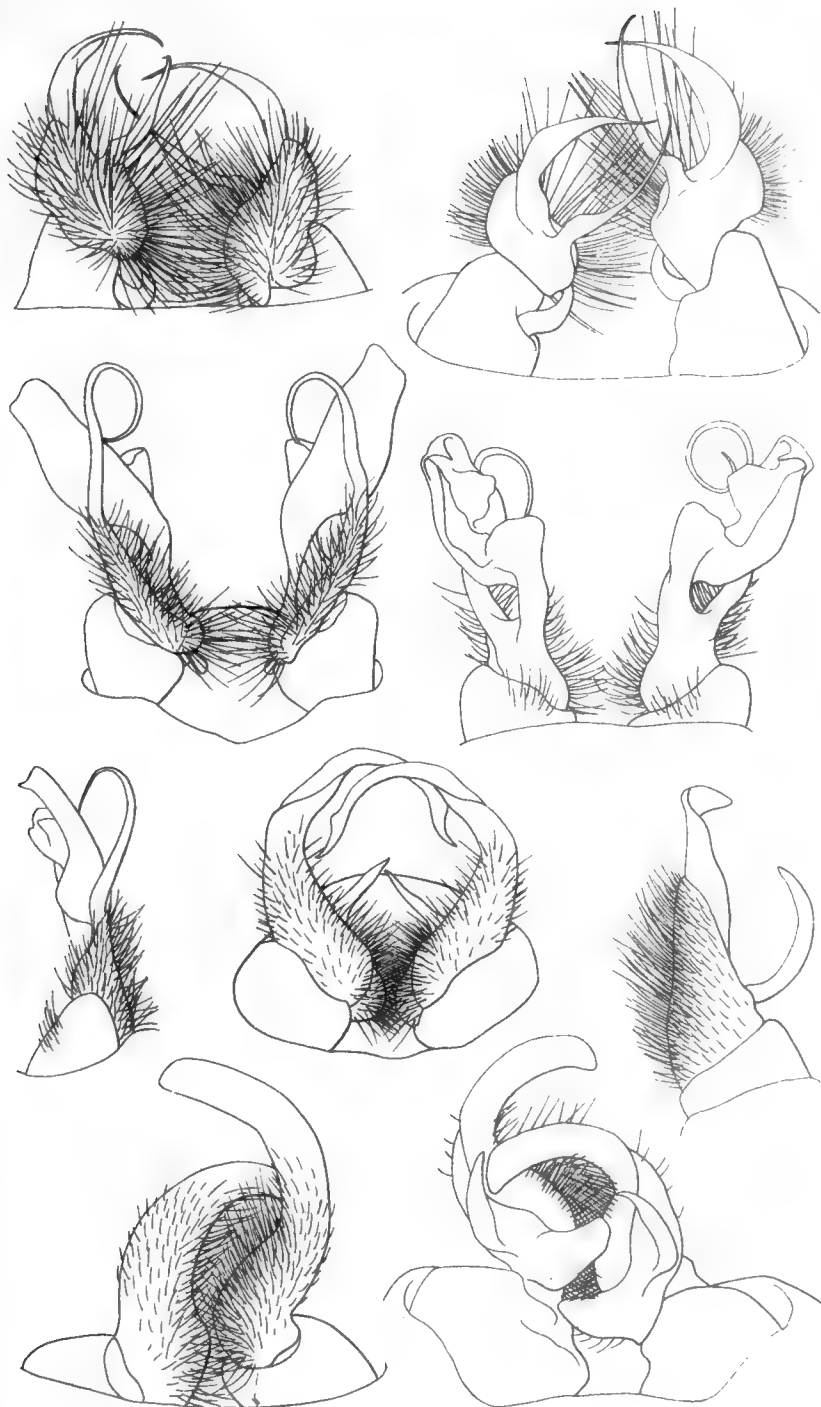
- FIG. 1, *a.* Gonapods, anterior view.
1, *b.* Gonapods, lateral view.
1, *c.* Gonapods, posterior view.

Scytonotus sp.

- FIG. 2, *a.* Gonapod, mesial view.
2, *b.* Gonapod, lateral view.
2, *c.* Eighteenth leg, posterior view.
2, *d.* Nineteenth leg, posterior view.

Tylobolus deses.

- FIG. 3, *a.* Head, first segment, and first pair of legs, posterior view.
3, *b.* Second pair of legs of male, with ventral lobes of second segment, posterior view.
3, *c.* Third leg of male, posterior view.
3, *d.* Basal joint of same, mesial view.
3, *e.* Fourth leg of male.
3, *f.* Fifth leg of male.
3, *g.* Gonapods, anterior view.
3, *h.* Gonapods, posterior view.



MYRIAPODS



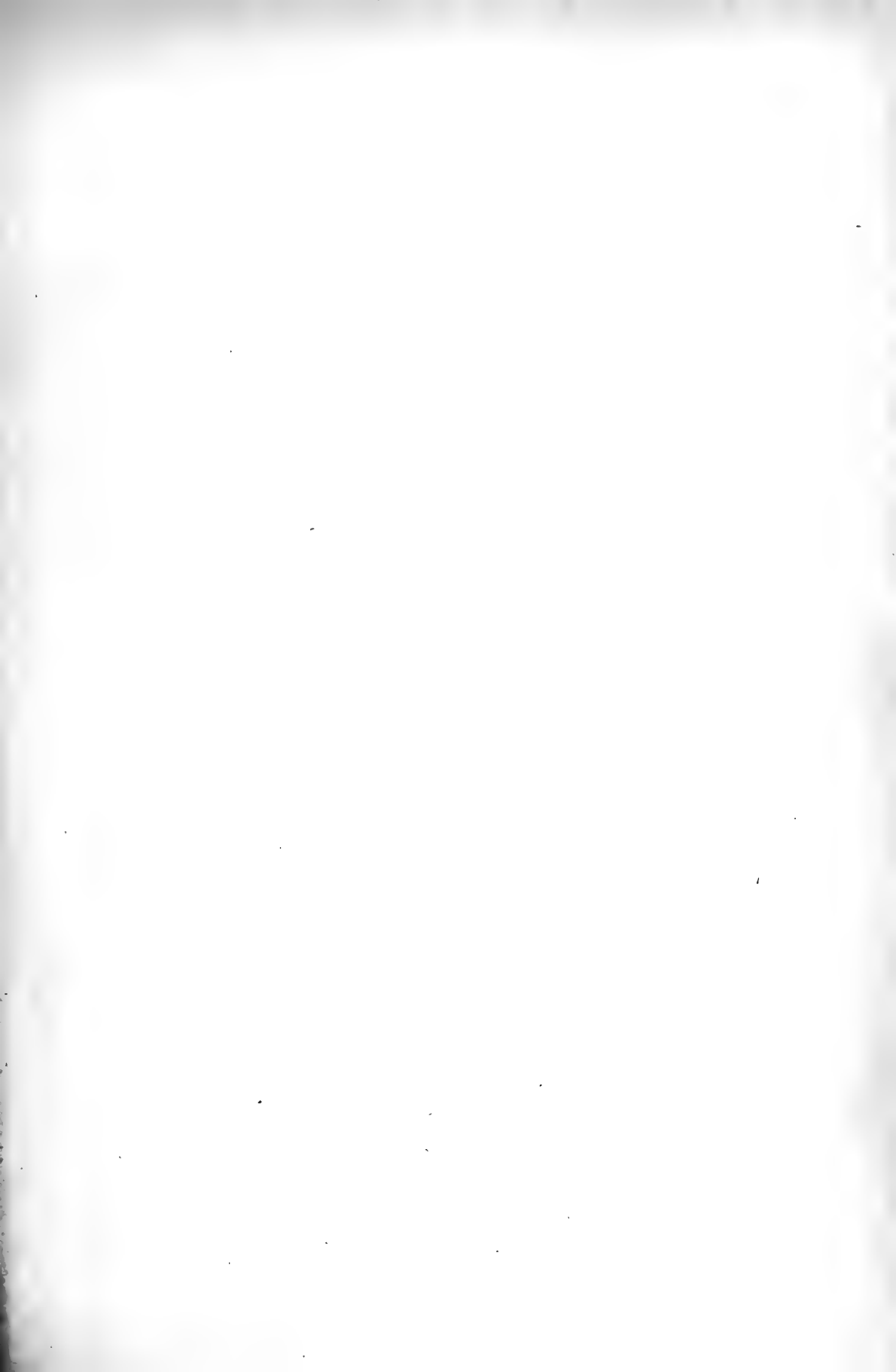


PLATE IV.

Isaphe convexa.

- FIG. 1, *a.* Gonapods, anterior view.
1, *b.* Gonapods, posterior view.

Chonaphe armata.

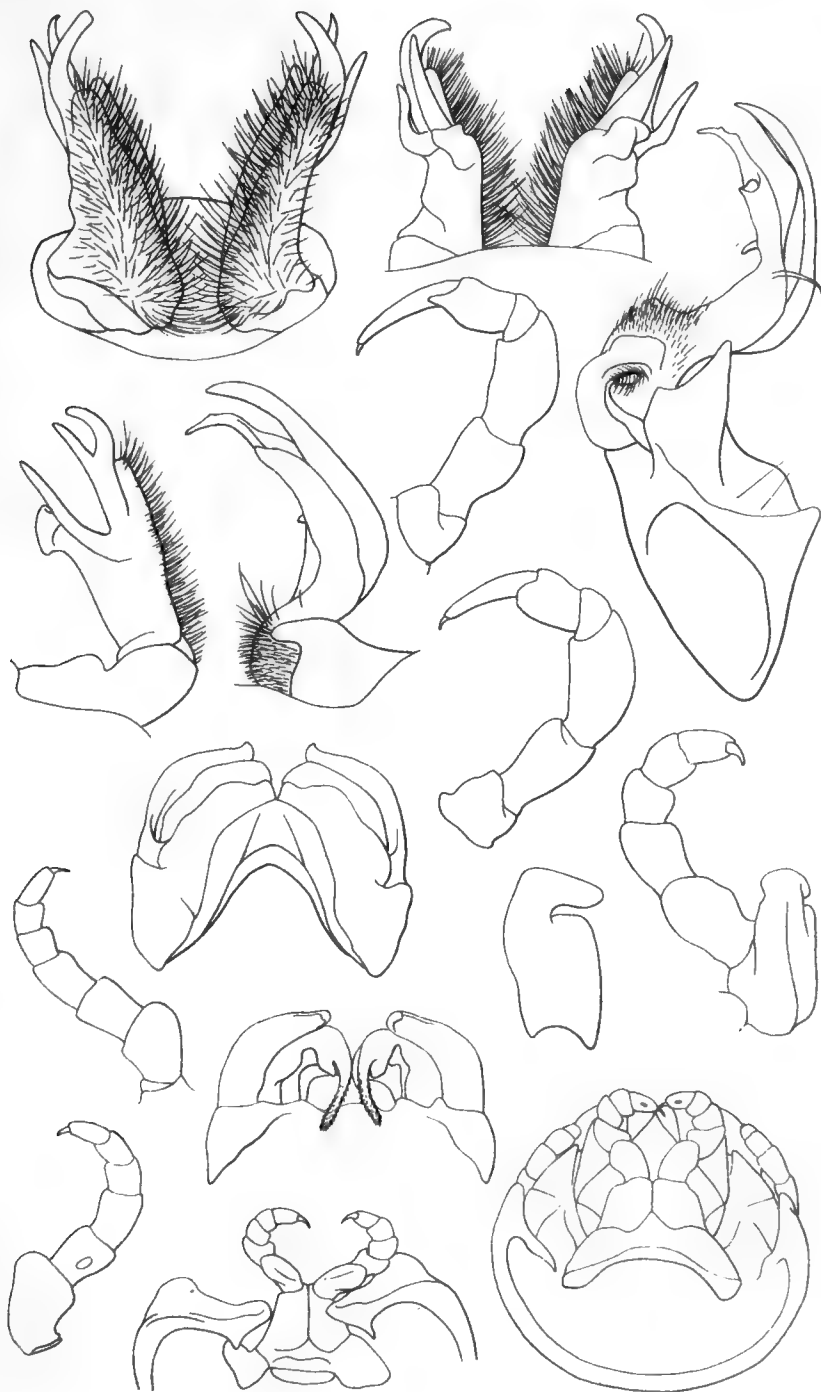
- FIG. 2, *a.* Gonapods, anterior view.
2, *b.* Gonapods, posterior view.
2, *c.* Gonapods, lateral view.

Hybaphe tersa.

- FIG. 3, *a.* Gonapods, posterior view.

Harpaphe haydeniana.

- FIG. 4, *a.* Gonapods, anterior view.
4, *b.* Gonapods, posterior view.
4, *c.* Gonapods, lateral view.



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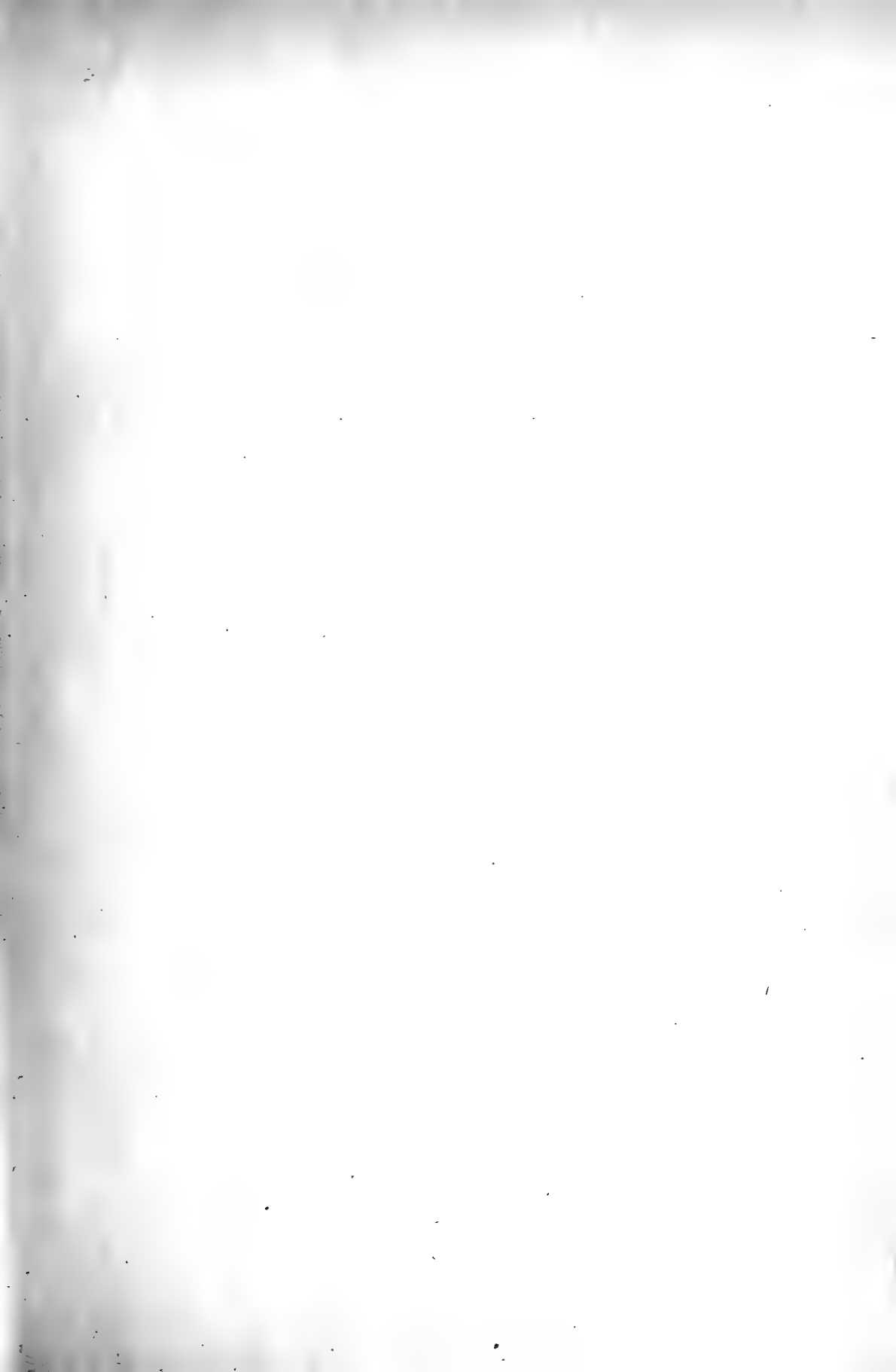


PLATE V.

Hypozoneum anurum.

- FIG. 1, *a.* First three segments, dorsal view.
1, *b.* First segment and head, anterior view.
1, *c.* Posterior segments, dorsal view. The last segment is concealed under the penultimate.
1, *d.* Antenna.

Platyzonium getschmannii.

- FIG. 2, *a.* First four segments and antenna, dorsal view. Drawn from type specimen in the Berlin Museum.

Polyzonium rosalbum.

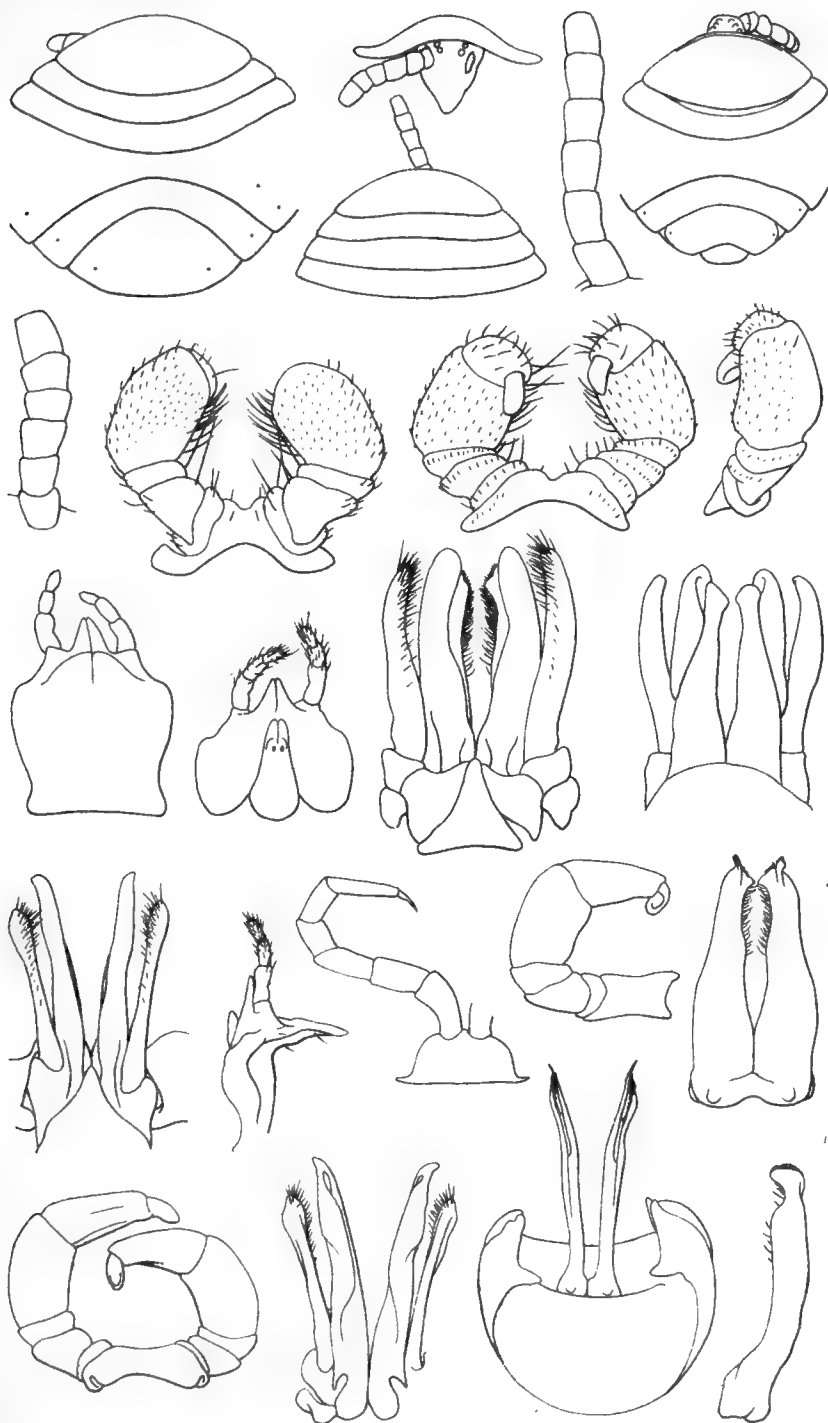
- FIG. 3, *a.* First four segments, head and antenna, dorsal view.
3, *b.* Last three segments, dorsal view.
3, *c.* Antenna. Same magnification as fig. 1, *d.*

Parajulus alaskanus.

- FIG. 4, *a.* First leg of male, anterior view.
4, *b.* First leg of male, lateral view.
4, *c.* First leg of male, posterior view.
4, *d.* Second leg of male, anterior view.
4, *e.* Second leg of male, lateral view.
4, *f.* Second leg and external ducts of male, posterior view.
4, *g.* Third, normal, leg of male.
4, *h.* Gonapods, anterior view.
4, *i.* Gonapods, posterior view.
4, *j.* Posterior gonapods, anterior view.
4, *k.* Posterior gonapod, lateral view.

Parajulus furcifer.

- FIG. 5, *a.* First leg of male, anterior view.
5, *b.* First leg of male, posterior view.
5, *c.* Anterior gonapods, anterior view.
5, *d.* Anterior gonapods, posterior view.
5, *e.* Posterior gonapods and seventh segment, anterior view.



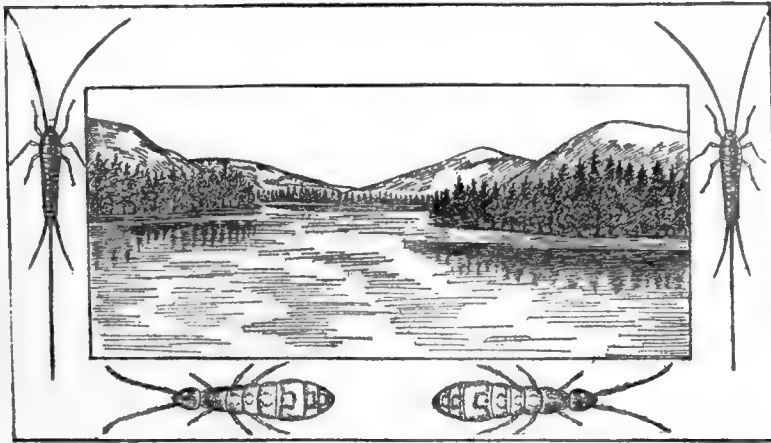
MYRIAPODS



APTERYGOTA OF ALASKA

The following paper on the Apterygota of Alaska, by Justus Watson Folsom, of the University of Illinois, was originally published in the Proceedings of the Washington Academy of Sciences, vol. iv, pp. 87-116, March 27, 1902. It is here reprinted from the same electrotype plates, so that it may be quoted exactly as if it were the original. The original pagination has been preserved and transferred to the inner or hinge side of the page, where it is enclosed in brackets, thus[88]; while the consecutive pagination of the present volume has been added in the usual place. In the plates the original numbers and running headline (slightly abbreviated) have been preserved [in brackets], while the volume designation and serial plate numbers have been added in the usual place. The original text references to the plates are unchanged. The present headpiece and title have been substituted for the running heading of the Academy's Proceedings and the original title, which was: *Papers from the Harriman Alaska Expedition. xxvii. Apterygota*. No other alterations have been made.

EDITOR.



APTERYGOTA OF ALASKA

BY JUSTUS WATSON FOLSOM

THIS paper deals with the Collembola and Thysanura collected in Alaska in June and July, 1899, by Professor Trevor Kincaid, of the Harriman Expedition, with the addition of a few forms collected by him in 1897. These are especially welcome as nothing has been published hitherto concerning the Collembola of Alaska, and because, with three exceptions, all of Professor Kincaid's species are either new or little known. Moreover, they suggest interesting problems in geographic distribution, a subject yet in its infancy, as regards this group. Fourteen forms are here described as follows:

- | | |
|--------------------------------------|--------------------------------------|
| <i>Neanura gigantea</i> Tull. | <i>Entomobrya kincaidi</i> sp. nov. |
| <i>Neanura ornata</i> sp. nov. | <i>Tomocerus niger</i> Bourl., type. |
| <i>Anurida amorita</i> sp. nov. | <i>Tomocerus niger</i> Bourl., var. |
| <i>Aphorura octopunctata</i> (Tull.) | <i>arcticus</i> Schött. |
| <i>Aphorura dentata</i> sp. nov. | <i>Tomocerus niger</i> Bourl., var. |
| <i>Isotoma fimetaria</i> (L.) Tull. | <i>americanus</i> Schött. |
| <i>Isotoma viridis</i> Bourl., type. | <i>Papirius palmatus</i> sp. nov. |
| <i>Isotoma viridis</i> Bourl., var. | <i>Machilis arctica</i> sp. nov. |
| <i>arctica</i> Schött. | |

Types of the above species and subspecies have been deposited in the United States National Museum, and all the Harriman specimens retain the numbers of the original labels.

NEANURA GIGANTEA Tull.

(Pl. IV, fig. 1; Pl. VI, figs. 11-13.)

Anura gigantea TULLBERG, Öfv. k. vet. Akad. förh., xxxiii, no. 5, p. 41, taf. 11, fig. 59, 1876 (Siberia).—SCHÖTT, K. sven. vet. Akad. hand., xxv, no. 11, p. 94, 1894 (Siberia).

Neanura gigantea SCHÄFFER, Fauna Arctica, 1, lief. 2, p. 240, 1900.

General color of alcoholic specimens indigo blue, with conspicuous blackish tubercles (fig. 1); living examples pruinose (Tullberg). Head twice as broad as long, with twelve large tubercles, including those bearing the eyes, arranged as in fig. 1. Eyes (fig. 11) five on either side. Postantennal organs (figs. 11, 12) each composed of more than 100 clavate papillæ forming a rosette. Antennæ half as long as the head, conical, with segments related in length as 4 : 3 : 2 : 6; basal and second segments half as long as broad; third and fourth coalescent; the minute antennal tubercles become successively smaller on each segment. Body oval in dorsal aspect; the number of large tubercles on each successive segment is, respectively, 6, 8, 8, 8, 8, 8, 8, 6, 2; the tubercle at either end of each transverse row is behind the others, on the first seven segments; on the seventh, both are also ventral and inconspicuous; on the eighth, four are ventral and two dorsal; the ninth segment is bent under and bears two small tubercles. Legs short and stout; claws (fig. 13) alike, stout, uniformly curving and tapering, strongly unidentate on the inner margin and minutely tuberculate. Cuticula finely tuberculate; large tubercles also reticulate (fig. 11), bearing several long stiff yellow setæ. Maximum length, 5 mm.

Two forms occur: broad ones, in which breadth is to length as 1 : 1.79; and narrow ones, in which the ratio is 1 : 2.27. This difference of proportion is independent of age, as it exists between specimens of equal length; it is found in other species of *Neanura*, and is presumably a sexual distinction.

Twenty-five specimens, St. Paul Island, Bering Sea, 1897.

The original description, although brief, suffices to place this well marked and monstrous species. Tullberg and Schött have recorded it from several localities in Siberia, Yenisei River (Latitude 61° to 73°). Schött also notes the species from the vicinity of St. Lawrence Bay. Tullberg (1876, p. 29) is confident that *Neanura gigantea* does not occur in Nova Zembla, Spitzbergen or Greenland.

NEANURA ORNATA sp. nov.

(Pl. IV, fig. 2; Pl. VI, figs. 14-18.)

White (fig. 2). Head (fig. 14) slightly longer than broad, rounded triangular. Eyes (fig. 14, *e, e, e*) not more than three on either side, in longitudinal alignment; two are close together and immediately behind the base of the antenna; the third is considerably behind these. The eyes are rudimentary; they lack pigment, and even the cornea, especially of the posterior eye, is frequently indistinguishable. Post-antennal organs absent. Antennæ (fig. 15) barely more than half as long as the head, with segments related as 5:4:4:6; basal segment stout, globose, reticulate; second and third globose, slightly or not at all reticulate; fourth conical, reticulate, the minute tubercles successively smaller on the first three segments but of equal size on the second and fourth. The large tubercles which characterize the genus coalesce on the head of this species but are indicated by the arrangement of the setigerous, reticulated areas. Buccal cone as in figure 16. Body segments related in length as 3:4:5:6:5:5:4:2:2; apical segment reduced and turned under; the number of large tubercles on each successive segment is, respectively, 6, 8, 8, 8, 8, 8, 8, 6, 2; on the fourth abdominal segment the two paramedian tubercles coalesce, while four are ventral; on the penultimate segment all six coalesce and on the apical segment the two tubercles are ventral. Each tubercle, though but slightly elevated, is defined by its chitinous reticulation and by two to four stiff serrulate setæ of two forms (fig. 17). The minute cuticular tubercles are not hemispherical as in other species of the genus, but are conical (fig. 17) and frequently clustered. Legs short and stout, with stout curving setæ; tibiæ with a subapical pair of appendages (fig. 18), pyriform in outline; claws (fig. 18) alike, apically curving, prominently unidentate at the base of the inner margin. Length, 1.4 mm.

As in *N. gigantea*, there are two forms, probably the sexes; a narrower kind (fig. 2) with abdomen gradually dilating, with average breadth to length as 1:2.8, and a broader form, oval-cylindrical, in which breadth: length = 1:2.

Type.—Cat. No. 5435, U. S. Nat. Museum.

Described from thirty-five types, Sitka, June, 1899 (No. 71).

Neanura ornata does not closely resemble any described species but recalls in its ocular characters an East Indian species, *N. fortis* Oudm. (Oudemans, 1890, p. 91; Schäffer, 1898, p. 399).

ANURIDA AMORITA sp. nov.

(Pl. iv, fig. 3; Pl. vi, figs. 19-24.)

General color bluish gray, due to the combined effect of indigo blue mottlings with the white ground color (fig. 3). The dorsum of each segment has two parallel broken blackish stripes (fig. 3). Eyes (fig. 19) five on either side, on blackish patches. Postantennal organs oval (fig. 20) or bent, as in fig. 21 (both figures are from the same head), with from thirty to forty elements. Antennæ almost as long as the head; segments related as 12 : 12 : 11 : 10; first three dilated apically; fourth rounded conical, bearing an organ (fig. 22) consisting of three large contiguous bladder-like structures upon a chitinous base. Body (fig. 3) elongated, abdomen gradually dilated. Claws of mid and hind feet (fig. 23) gradually tapering from a broad base, slightly curving, strongly unidentate near the middle of the inner margin; claws of fore feet (fig. 24) smaller and less tapering. Clothing of short dense curving setæ, with a transverse row of long hairs on each segment. Maximum length, 4.1 mm.

Type.—Cat. No. 5437, U. S. Nat. Museum.

Described from thirty-six types, Kukak Bay (No. 70).

This species is most nearly allied to *A. tullbergi* Schött (1891, p. 192; 1894, pp. 91-92, taf. 8, figs. 16-18) which, however, has but twenty-four to thirty-eight elements in each postantennal organ, and more slender, untoothed claws, not to mention differences of minor importance. The curious antennal organ, already found on *A. marzima*, attains a much greater size in *A. amorita*.

APHORURA OCTOPUNCTATA (Tull.).

(Pl. vii, figs. 25-28.)

Lipura octo-punctata TULLBERG, Öfv. k. vet. Akad. förh., xxxiii, no. 5, p. 40, taf. 11, figs. 51-53, 1876 (Siberia).—SCHÖTT, K. sven. vet. Akad. hand., xxv, no. 11, p. 88, 1894 (Siberia).

Aphorura octopunctata SCHÄFFER, Fauna Arctica, bd. 1, lief. 2, p. 241, 1900.

White. Postantennal organs (fig. 25) elliptical, of about thirty-three to thirty-seven elements. Pseudocelli of the head, fourteen; four behind the base of either antenna (fig. 25) and six, in two transverse rows, on the posterior border of the head. Antennæ shorter than the head, with segments related in length nearly as 7 : 10 : 9 : 12; basal seg-

ment stout, second cylindrical, third petiolate, terminal segment cylindrical with rounded apex; antennal organ (fig. 26) composed of five chitinous finger-like processes. Body cylindrical, its segments related as 23 : 26 : 29 : 25 : 22 : 27 : 27 : 27 : 10. Superior claws (fig. 27) broad, curving, distinctly unidentate near the middle of the inner margin; inferior claws slightly longer, slender, gradually attenuating into a fine filament, untoothed. Anal spines (fig. 28) two, half as long as a superior claw, feebly arcuate, on prominent papillæ. Body sparsely clothed with short curved setæ and occasional longer stiff setæ, the latter becoming more numerous towards the extremity of the abdomen. Length, 2.7 mm.

Three specimens, Sitka, June, 1899 (No. 71).

The Harriman examples of this species agree satisfactorily with the original diagnosis except for lacking a tooth on the inferior claw. The pseudocelli of the body were not studied on account of insufficient material.

A. octopunctata has seldom been recorded. It was described from a single individual taken at Dudinskoe, Siberia (Latitude 69° 25' N.), by the Nordenskiöld Expedition in 1875 (Tullberg, 1876, p. 40). The Yenisei Expedition of the following year collected examples at Tschulkova, in Latitude 62° 45' N., and the Vega Expedition of 1878-79 found a single specimen at Irkaipi, in Chukchi Land (Latitude 68° 36' N. Schött, 1894, p. 88).

APHORURA DENTATA sp. nov

(Pl. VII, figs. 29-36.)

White (fig. 29). Postantennal organs (fig. 30) elongate, of very many minute papillate elements, underlying which are seventeen or more oval structures (fig. 31). Pseudocelli of the head eight, of which two lie behind the base of either antenna (fig. 32) and the remaining four occupy the posterior border of the head (fig. 29). The areas adjoining the antennæ are more finely tuberculate than the rest of the head. Antennæ slightly shorter than the head, with segments related nearly as 2 : 5 : 4 : 5; basal segment cup-shaped, second and third clavate and petiolate, fourth conical; antennal organ (fig. 33) of five, rarely four, stout conical processes. Body cylindrical (fig. 29); segments related as 10 : 13 : 16 : 13 : 13 : 12 : 14 : 10 : 3; the number of dorsal pseudocelli for each successive segment is, respectively (fig. 29), 4, 8, 8, 4, 4, 4, 6, 6, 0. Superior claws (fig. 34) strongly curved, five-toothed, as follows: paired pseudonychia occur one-third from the base of the claw, a

second pair of lateral teeth is found one-seventh from the apex, and a fifth, or median, tooth is situated as far again from the apex; inferior claws untoothed, slender, gradually attenuating into a filament which extends beyond the superior claw, inner margin roundly and narrowly dilated at base; both claws are basally tuberculate. Anal spines (figs. 35, 36) two, less than half as long as a superior claw, almost straight, separated basally by half their length and not seated upon papillæ. Clothing of short dense curving setæ with occasional long stiff setæ on antennæ and abdomen, the latter more numerous towards the apex of the abdomen. Maximum length, 4 mm.

Type.—Cat. No. 5436, U. S. Nat. Museum.

Sixteen types: ten from Seldovia, Cook Inlet, July, 1899, under stones at tide mark (No. 62); five, Cook Inlet, 1899 (No. 60); one from St. Paul Island, Bering Sea, August 1, 1897.

Although *A. dentata* shares many of its characters with other species, in no other form do they approach a similar combination. The five-toothed claws are most distinctive.

ISOTOMA FIMETARIA (L.) Tull.

(Pl. VII, figs. 37-39.)

? *Podura terrestris alba* LINNAEUS, Fauna Suecica, Ed. 1, p. 343, 1746.

? *Podura fimetaria* LINNAEUS, Fauna Suecica, Ed. 2, 1761.

Isotoma alba TULLBERG, Öfv. k. vet. Akad. förh., XXVIII, no. 1, p. 152, 1871 (Sweden).

Isotoma fimetaria TULLBERG, k. sven. vet. Akad. hand., x, no. 10, p. 48, taf. 9, figs. 32, 33, 1872 (Sweden).—TULLBERG, Öfv. k. vet. Akad. förh., XXXIII, no. 5, p. 37, 1876 (Greenland, Siberia).—MACGILLIVRAY, Can. Ent., XXIII, p. 273, 1891.—UZEL, Sitzber. k. böhm. Gesell. Wiss., II, p. 66, 1891 (Bohemia).—SCHÖTT, K. sven. vet. Akad. hand., XXV, no. 11, p. 75, 1894 (Siberia).—DALLA TORRE, Die Gattungen und Arten der Apterygo-genea (Brauer), p. 9, 1895.—REUTER, Acta Soc. Faun. Flora fenn., XI, no. 4, pp. 28-29, 1895 (Finland).—MACGILLIVRAY, Can. Ent., XXVIII, p. 58, 1896.—SCHÄFFER, Mitt. naturh. Mus. Hamburg, XIII, p. 183, 1896 (Germany).—SCHÖTT, Proc. Cal. Acad. Sc., VI (2), p. 184, 1896 (California).—LIE-PETTERSEN, Bergens Mus. Aarb. (1896), no. 8, p. 18, 1897 (Norway).—MEINERT, Vidensk. Med. naturh. Foren. Kjobenhavn (1896), p. 169, 1897 (Greenland).—LIE-PETTERSEN, Bergens Mus. Aarb., no. 6, p. 13, 1898 (Norway).—SCHERBAKOF, Zool. Anz., XXI, p. 58, 1898 (Russia).—SCHERBAKOF, Materiali, etc., Apteryg., Vicinity of Kief, p. 12, 1898 (Russia).—CARPENTER and EVANS, Proc. R. Phys. Soc. Edinburgh, XIV, p. 251, pl. 8, figs. 3, 4, 1899 (Scotland).—SCHERBAKOF, Zool. Anz., XXII, p. 47, 1899 (Spitzbergen).—CARPENTER, Sc. Proc. R. Dublin Soc., IX. (n. s.), pt. 3, p. 274, 1900 (Franz Josef Land).—SCHÄFFER, Fauna Arctica, I, lief. 2, p. 247 (Massachusetts).

White. Eyes absent. Postantennal organs small, elliptical. Antennæ (fig. 37) subequal to head in length, segments related as 3 : 5 :

11; basal segment stout, cylindrical; second cylindrical; third clavate, apically constricted; fourth subclavate, apically rounded. Body elongate; segments in relative lengths as 2:6:6:5:6:6:5:3:2. Superior claws (fig. 38) slightly tapering, feebly curved, inner margin excavated, untoothed; inferior claws two-thirds as long, broadly lanceolate, acute, with a longitudinal rib parallel with the inner margin; tenent hairs absent. Furcula appended to the fourth abdominal segment, short, not attaining the ventral tube; dentes nearly twice the manubrium in length, slender, uniformly tapering; mucrones (fig. 39) slender, conspicuously bidentate; apical tooth slightly hooked, second tooth larger, erect. Clothing of numerous short setæ of two kinds, stiff or curving, becoming longer toward the apex of the abdomen. Length 1.6 mm.

Two specimens, Sitka, June, 1899 (No. 71).

The Alaska specimens agree with European examples of the species which I received from Dr. Schäffer, except in having stouter claws and antennæ and in being rather larger. There is less agreement with specimens from Massachusetts, as the antennæ of the Alaskan forms are shorter as compared with them, the claws stouter and the mucrones more slender, with subequal teeth; moreover, the fourth abdominal segment, shorter than the third in the latter specimens, is twice as long as the third in the Harriman examples.

Isotoma fmetaria, well known in northern and middle Europe, is also widely distributed through the Arctic regions, as the above list shows. The species doubtless occurs extensively in the United States also, being recorded from California and having been found by myself in Massachusetts and Ohio.

ISOTOMA VIRIDIS Bourl.

(Pl. iv, fig. 4, type.)

- ? *Podura viridis* MÜLLER, Zoologiae Danicae Prodrömus, p. 183, 1776 (Denmark).—? GMELIN, in Linné Systema Naturae, Ed. 13, p. 2910, 1788.
Podura viridis BOURLET, Mémoire Podurelles, p. 24, 1843 (France).
 ? *Podura plumbea* MÜLLER, Zoologiae Danicae Prodrömus, p. 183, 1776.—
 ? O. FABRICIUS, Fauna Groenlandica, p. 211, 1780 (Greenland).
Isotoma viridis BOURLET, Mém. soc. sc. agric. arts Lille, Pt. I, p. 401, 1839 (France).—GERVAIS, in Walckenaer, Hist. nat. ins. apt., III, p. 433, 1844.—LUBBOCK, Monograph Coll. and Thys., p. 169, 1873 (England).
 —PARONA, Saggio Catalogo Pod. Ital., p. 42, 1878 (Italy); Ann. mus. civ. st. nat. Genova, XVIII, p. 463, 1883.—REUTER, Öfv. finsk. vet. soc. förh., XXXIII, p. 229, 1891 (Siberia).—SCHÖTT, K. sven. vet. Akad. hand., XXV, No. 11, pp. 59-61, taf. 5, figs. 1-5; taf. 6, figs. 1, 2, 1894

- (Siberia).—DALLA TORRE, Die Gattungen und Arten der Apterygogenea (Brauer), p. 10, 1895.—REUTER, Acta Soc. Fauna Flora fenn., xi, no. 4, pp. 25–26, 1895 (Finland).—MACGILLIVRAY, Can. Ent., xxviii, p. 58, 1896 (Mass., Tex., N. Y.).—SCHÄFFER, Mitt. naturh. Mus. Hamburg, xliii, pp. 184–186, taf. 3, fig. 80, 1896 (Germany).—LIE-PETTERSEN, Bergens Mus. Aarb. (1896), No. 8, p. 17, 1897 (Norway); *ibid.*, No. 6, p. 12, 1898.—MEINERT, Vidensk. Med. naturh. Foren. Kjobenhavn (1896), p. 169, 1897 (Greenland).—SCHERBAKOF, Zool. Anz., xxi, p. 58, 1898 (Russia); Materials, etc., Apteryg. Vicinity of Kief, p. 7, 1898; Zool. Anz., xxii, p. 47, 1899 (Spitzbergen).—CARPENTER and EVANS, Proc. R. Phys. Soc. Edinburgh, xiv, p. 246, pl. 7, fig. 17, 1899 (Scotland).—WAHLGREN, Öfv. k. vet. Akad. förh., lvi, No. 4, p. 338, 1899 (Spitzbergen); Ent. Tidsk., xx, hft. 2–3, pp. 186–190, 1899 (Sweden).—KIEFFER, Berl. ent. Zeits., xlv, hft. 1–2, p. 113, 1900 (Germany).—SCHÄFFER, Fauna Arctica, i, lief. 2, p. 245, 1900; Jahreshefte Vereins vaterl. Naturk. Württemberg, lvi, p. 256, 1900 (Germany).
- Isotoma caerulea* BOURLET, Mém. soc. sc. agric. arts Lille, Pt. 1, p. 401, 1839.—GERVAIS, in Walckenaer, Hist. nat. ins. apt., iii, p. 433, 1844.
- Isotoma arborea* BOURLET, Mém. soc. sc. Agric. arts Lille, Pt. 1, p. 401, 1839.—PARONA, Saggio Catalogo Pod. ital., pp. 40–41, 1878; Ann. mus. civ. st. nat. Genova, xviii, pp. 462–463, 1883; *ibid.*, 2d ser., vi, p. 143, 1888.
- Desoria virescens* NICOLET, Recherches Podurelles, p. 59, pl. 5, fig. 12, 1841 (Switzerland).—GERVAIS, in Walckenaer, Hist. nat. ins. apt., iii, p. 428, 1844.
- Desoria cylindrica* NICOLET, Recherches Podurelles, p. 60, pl. 6, fig. 1, 1841.—GERVAIS, in Walckenaer, Hist. nat. ins. apt., iii, p. 429, 1844.
- Desoria viatica* NICOLET, Recherches Podurelles, p. 61, pl. 6, fig. 2, 1841.—GERVAIS, in Walckenaer, Hist. nat. ins. apt., iii, pp. 429–430, 1844.
- Desoria pallida* NICOLET, Recherches Podurelles, p. 61, pl. 6, fig. 3, 1841.—GERVAIS, in Walckenaer, Hist. nat. ins. apt., iii, p. 430, 1844.
- Desoria ebriosa* NICOLET, Recherches Podurelles, p. 61, pl. 6, fig. 4, 1841.—GERVAIS, in Walckenaer, Hist. nat. ins. apt., iii, p. 430, 1844.
- Desoria annulata* NICOLET, Recherches Podurelles, p. 62, pl. 6, fig. 5, 1841.—GERVAIS, in Walckenaer, Hist. nat. ins. apt., iii, p. 430, 1844.
- Desoria fusca* NICOLET, Recherches Podurelles, p. 63, pl. 6, fig. 7, 1841.—GERVAIS, in Walckenaer, Hist. nat. ins. apt., iii, p. 431, 1844.
- Podura arborea* BOURLET, Mémoire Podurelles, p. 24, 1843.
- Podura annulata* BOURLET, *ibid.*
- Isotoma Desmarestii* GERVAIS, in Walckenaer, Hist. nat. ins. apt., iii, p. 436, pl. 50, fig. 11, 1844.
- Heterotoma chlorata* GERVAIS, *ibid.*, pp. 421–422, pl. 50, fig. 6, 1844.
- Isotoma virescens* NICOLET, Ann. soc. ent. France, 2d ser., v, 1847.
- Isotoma pallida* NICOLET, *ibid.*
- Isotoma annulata* NICOLET, *ibid.*—LUBBOCK, Monograph Coll. and Thys., p. 175, 1873.—PARONA, Ann. mus. civ. st. nat. Genova, xviii, p. 463, 1883.
- Isotoma fusca* NICOLET, Ann. soc. ent. France, 2d ser., v, 1847.—LUBBOCK, Monograph Coll. and Thys., pp. 175–176, 1873.—TÖMÖSVÁRY, Math. term. közlem. Magyar Ak., xviii, p. 124, 1882 (Hungary).—PARONA, Ann. mus. civ. st. nat. Genova, xviii, p. 463, 1883; *ibid.*, 2d ser., vi, p. 143, 1888.
- Isotoma anglicana* LUBBOCK, Trans. Linn. Soc. London, xxiii, Pt. 3, p. 596, 1862; Monograph Coll. and Thys., pp. 171–172, pl. 38, 1873.
- Isotoma lineata* LUBBOCK, Trans. Linn. Soc. London, xxiii, Pt. 3, p. 597, 1862.

- Isotoma paucistris* var. *unicolor* TULLBERG, Öfv. k. vet. Akad. förh., xxviii, no. 1, p. 151, 1871.
- Isotoma palustris* var. *annulata* TULLBERG, *ibid.*
- Isotoma palustris* var. *viridis* TULLBERG, K. sven. vet. akad. hand., x, no. 10, p. 46, taf. 9, figs. 1-8, 1872 (Sweden, Spitzbergen, Bering Id.).—UZEL, Sitzber. k. böh. Gesell. Wiss., II, p. 63, 1891 (Bohemia).
- Isotoma palustris* var. *fusca* TULLBERG, K. sven. vet. Akad. hand., x, no. 10, p. 46, taf. 9, figs. 1-8, 1872.—UZEL, Sitzber. k. böh. Gesell. Wiss., II, p. 63, 1891.
- Isotoma Belfragei* PACKARD, Fifth Rep. Trust. Peab. Acad., pp. 33-34, 1873 (Texas).—MACGILLIVRAY, Can. Ent., xxiii, p. 273, 1891.
- Isotoma tricolor* (in part) PACKARD, Fifth Rep. Trust. Peab. Acad., p. 34, 1873 (Mass.).—MACGILLIVRAY, Can. Ent., xxiii, p. 274, 1891 (D. C.).
- Isotoma purpurascens* PACKARD, Fifth Rep. Trust. Peab. Acad., pp. 34-35, 1873 (Texas).—MACGILLIVRAY, Can. Ent., xxiii, p. 274, 1891.
- Isotoma plumbea* PACKARD, Fifth Rep. Trust. Peab. Acad., p. 35, 1873 (Mass.).—MACGILLIVRAY, Can. Ent., xxiii, p. 274, 1891 (L. I., Ohio).
- Isotoma palustris* TULLBERG, Öfv. k. vet. akad. förh., xxxiii, no. 5, pp. 34-35, 1876 (Siberia).

Alcoholic specimens are either dark green with pale green legs and furcula, or are dark brown. Dorsum marked (fig. 4) with pale round and oval spots, most numerous on meso- and metanotum. Eyes as in figure 40 (var. *arctica*), eight on either side. Postantennal organs ovate to oval. Antennæ half as long again as the head; segments in relative lengths as 4:6:6:7. Body cylindrical; segments related as 4:10:9:7:8:10:9:4:2. Superior claws (fig. 41, var. *arctica*) long, slender, tapering, slightly curving, laterally pseudonychiate, inner margin bidentate; inferior claws less than half as long, parallel sided, acute, apically curving; tenent hair unknobbed. Furcula half as long as the body; dentes nearly three times the manubrium in length; mucrones (fig. 42, *arctica*) subequally tridentate; teeth large, blunt, apical tooth falcate, second and third subfalcate and opposite each other. Clothing of dense short curving setæ, with long barbellate hairs on the posterior part of the abdomen. Length 6 mm.

Three individuals, St. Paul Id., 1897; three, Popof Id., 1899 (No. 96).

These agree in every essential respect with European examples of *I. viridis*, forma *principalis*, received from Dr. Schäffer and also with specimens collected by myself in Massachusetts, Ohio and Illinois; the Alaskan forms differ from any which I have seen, however, by being larger and in having no tooth on the inferior claw, with the exception of a single small specimen, 2 mm. long.

It is not surprising to meet *I. viridis* from Alaska, as the species has repeatedly been recorded from the Arctic regions and ranges throughout Europe and the United States.

ISOTOMA VIRIDIS Bourl., var. ARCTICA Schött.

(Pl. IV, fig. 5; Pl. VII, figs. 40-42.)

Isotoma viridis, var. *arctica* SCHÖTT, K. sven. vet. Akad. hand., XXV, no. 11, p. 61, taf. 5, fig. 4, 1894.—SCHÄFFER, Fauna Arctica, I, lief. 2, p. 245, 1900.

The preceding description of the typical form applies equally well to the variety *arctica* with the following modifications: *arctica* is longer, more slender (fig. 5) and is yellow, marked with dark blue; each of the last seven segments bears a dorsal deltoid mark by which the variety may be recognized. Length, 7 mm.

Three specimens, Popof Id., 1899 (no. 96).

The two types of Schött came from Port Clarence, on the American side of Bering Strait. Schäffer gives southern Russia as a second locality.

ENTOMOBRYA KINCAIDI sp. nov.

(Pl. VIII, figs. 43-45.)

Olive green with pale mottlings. Head yellowish, oral region dark. Eye patches widely separated; eyes (fig. 43) eight on either side. Antennæ twice as long as the head, or half as long as the body, with segments related as 3:5:4:6; basal ring blackish; basal segment yellow, dusky proximally, second yellow, third yellow, dark distally; fourth elliptical, yellow with dusky apex. Body fusiform, segments as 4:24:15:10:13:13:40:12:6 in relative lengths; sides dusky, also the anterior border of the mesonotum, and the posterior borders of the fourth and sixth abdominal segments. Legs yellowish; superior claws (fig. 44) broad, straight, inner margin bidentate, a tooth occurring one-fourth, and another one-half the distance from the apex; outer margin untoothed; inferior claws two-thirds as long, broadly linear, acute, untoothed; tenent hair single, knobbed. Furcula white, as long as the antennæ; dentes slender, one-third longer than the manubrium; mucrones (fig. 45) tridentate, as usual, with an apical hook, a second tooth which is conical, erect, and as long as the width of the dens, and a third, small acicular oblique tooth; three barbellate hairs project far beyond the mucrones. Antennæ, legs and furcula densely clothed with short curving barbellate setæ interspersed with long barbellate hairs, which are longest on the last three abdominal segments; stout clavate barbellate setæ occur between the eye patches, on the occiput and on the anterior borders of meso- and metanotum. Length, 1.9 mm.

Type.—Cat. No. 5509, U. S. Nat. Museum.

Four types, Muir Glacier ("hillside to right"), June 11, 1899 (No. 68).

In coloration *E. kincaidi* is much like *E. griseo-olivata* Pack. ('73, p. 39) but the two species differ sufficiently in structural details. In Packard's species the inferior claws are basally dilated, the mucrones strongly falcate, and the fourth abdominal segment is four times as long as the third.

Next to *griseo-olivata*, *kincaidi* is most nearly allied to *marginata* Tull. and *muscorum* Tull. (not Nic.), European specimens of which have been furnished me by Dr. Schäffer.

Named after Professor Trevor Kincaid, of the University of Washington, who has materially assisted in extending our knowledge of Arctic Collembola.

TOMOCERUS NIGER Bourl.

(Pl. VIII, figs. 46, 47.)

Macrotoma nigra BOURLET, Mém. soc. sc. agric. arts Lille, Pt. I, p. 14, 1839 (France).—GERVAIS, in Walckenaer, Hist. nat. ins. apt., III, p. 408, pl. 50, fig. 7, 1844.

Macrotoma ferruginosa BOURLET, Mém. soc. sc. agric. arts Lille, Pt. I, p. 14, 1839.—GERVAIS, in Walckenaer, Hist. nat. ins. apt., III, p. 408, 1839.

Tomocerus celer NICOLET, Rech. Podurelles, p. 69, pl. 7, fig. 9, 1841 (Switzerland); Ann. soc. ent. France, 2d ser., v, 1847.—PARONA, Ann. sc. r. inst. tec. Pavia, tav. 2, fig. 7, 1875 (Italy).

Macrotoma celer GERVAIS, in Walckenaer, Hist. nat. ins. apt., III, p. 407, pl. 50, fig. 7, 1844.

Macrotoma lepida GERVAIS, *ibid.*, p. 409.

Tomocerus lepida NICOLET, Ann. soc. ent. France, 2d ser., v, 1847.

Macrotoma flavescens TULLBERG, Öfv. k. vet. Akad. förh., XXVIII, no. 1, p. 149, 1871 (Sweden); K. sven. vet. Akad. hand., x, no. 10, pp. 36–37, taf. 5, figs. 1–6, 1872.—UZEL, Sitzber. k. böh. Gesell. Wiss., II, p. 48, 1891 (Bohemia).

Tomocerus niger LUBBOCK, Monograph Coll. and Thys., pp. 139–140, 1873 (England).—PARONA, Saggio catalogo Pod. ital., pp. 25–26, 1878 (Italy); Ann. mus. civ. st. nat. Genova, XVIII, p. 456, 1883; *ibid.*, 2d ser., VI, p. 139, 1888.—REUTER, Acta. Soc. Fauna Flora, fenn., XI, no. 4, p. 15, 1895 (Finland).—CARPENTER and EVANS, Proc. R. Phys. Soc. Edinburgh, XIV, pp. 236–237, pl. 7, fig. 16, 1899 (Scotland).—SCHÄFFER, Jahreshfte Vereins vaterl. Naturk. Württemberg, LVI, p. 274, 1900 (Germany).

Tomocerus flavescens SCHÖTT, K. sven. vet. Akad. hand., XXV, no. 11, p. 42, 1894 (Norway).—DALLA TORRE, Die Gattungen und Arten der Apterygogenea (Brauer), p. 11, 1895.—SCHÄFFER, Mitt. naturh. Mus. Hamburg, XIII, pp. 204–205, 1896 (Germany).—LIE-PETTERSEN, Bergens Mus. Aarb. (1896), no. 8, p. 11, 1897 (Norway); *ibid.*, no. 6, p. 8, 1898.—SCHERBAKOF, Zool. Anz., XXI, p. 60, 1898 (Russia); Materiali, etc., Apteryg. Vicinity of Kief, p. 20, 1898.—ABSOLON, Studies Morav. Cave Apt., pp. 32–33, 1900 (Moravia).

Cream yellow when denuded of scales. Eyes six on either side, on black patches close behind the bases of the antennæ. Antennæ shorter than the body; basal ring prominent; first segment yellow or purplish; second and third yellow, frequently purplish apically; third often purple throughout; fourth segment purple. Legs yellow, excepting the tibiæ, which are purplish distally; superior claws (fig. 46) long, slender, uniformly tapering, straight, pseudonychiæ, inner margin bidentate, or, less than half as often, tridentate; inferior claws half as long, straight, tapering, acuminate, inner margin unidentate near the middle; tenent hair knobbed. Furcula yellow. Dental spines (fig. 47) seven to nine, becoming successively smaller toward the base of each dens until the large proximal spine is reached; the distal spine is more lateral than the rest and there may be two of them on either side; a lanceolate acuminate transparent scale occurs near the proximal spine or spines. Clothing of scales, with numerous clavate setæ on head and legs, interspersed with many long stiff hairs, especially on femora and manubrium; mesonotal collar of stiff setæ, finely barbelate apically; similar setæ occur on the manubrium among the short reclinate bristles; the furcula bears scales above and long plumes beneath. Length, 5 mm.

Twenty-one specimens, Yakutat, June, 1899 (Nos. 57, 69); three, Cook Inlet, 1899 (No. 60); one, Popof Island, 1899 (No. 96); one, Juneau, 1899 (No. 56); four, Sitka, June, 1899 (Nos. 64, 71); three, Berg Bay, June 10, 1899 (No. 72); fifty-five, Muir Glacier, west side, June 12, 1899 (No. 63), comprising intergradations between *niger*, *arcticus* and *americanus*, but consisting principally of typical *arcticus*.

Many of the specimens from which the preceding description was made conformed to authoritative descriptions and figures of the well-known *T. flavescens* (more properly termed *niger*), of Europe, and also agreed with eight examples of the species given me by Dr. Schäffer. Most of the Harriman specimens varied greatly, however, in the characters of accepted specific value—for example, those of the claws and dental spines. These variations, bearing importantly upon the interrelations of three members of the genus, are tabulated below.

Tullberg's (1872, pp. 36-37, taf. 5, figs. 1-6) diagnosis of *T. flavescens* is, "Antennæ corpore non longiores. Spinæ dentium simplices 7-8, intima magna. Unguiculus superior dentibus 2 instructus, inferior lanceolatus. Long. 4 millim." Tullberg adds that the inferior claws are unidentate. With this description compare the following records. The figures after the + signs refer to the number of large spines beside each dental scale.

Teeth of superior claws.				Dental spines.	
Class.	Fore foot.	Mid foot.	Hind foot.	Right dens.	Left dens.
1	2	2	2	5 + 2	7 + 2 Common
2	3	2	2	6 + 1	6 + 1 Occasional
3	3	3	3	7 + 2	6 + 2 Two specimens
4	4	3	3	?	? One specimen
5	4	4	3	8 + 2	8 + 2 " "
6	4	4	4	8 + 2	7 + 2 " "

Excepting these variations, all the individuals are essentially alike and nearly all the variations given are found in one lot of specimens (No. 63, Muir Glacier), among which are also the forms *arcticus* and *americanus*. Individuals of class No. 1 are clearly *niger* (*flavescens*). Those of No. 2 depart from the type in having an extra tooth but are more typical than No. 1 by having but one accessory spine. Having admitted No. 2 as *niger*, how may we exclude No. 3, as regards the claws? The number of spines is normal on the left, and but one too many on the right dens. Considering the numerical variability of the spines, No. 3 could still be called *niger*. Notice, however, that No. 3 is just as evidently a variety of *T. americanus* Schött. His diagnosis (1896, p. 172, pl. 16, figs. 6, 7) provides especially for the three-toothed form. Nos. 4, 5 and 6 are clearly *americanus*, in which Schött himself found great variability and affinities with *flavescens*.

Any distinction between *niger* and *americanus*, then, must be artificial and arbitrary. This is not all, for *T. arcticus* enters the discussion. Schött (1894, pp. 43-44, taf. 3, figs. 8, 9) distinguishes *arcticus* as having (1) four teeth normally on each superior claw (five may occur on any foot, but his statement, "doch scheinen 4 Zähne auf allen das normale zu sein," holds, nevertheless), (2) "Spinæ dentium simplices, septem vel interdum octo, intima parva." The only apparent differences, therefore, between *arcticus* and *americanus* are the absence of a tooth on the inferior claws of *arcticus* and of two large spines beside each dental scale. Now the tooth mentioned was present on most of the Alaskan examples of *arcticus*, although not referred to by Schött, in whose specimens it was very likely absent. As to the accessory spines, one such is indeed mentioned by Schött and several of the Alaskan specimens, which occurred with typical *arcticus* and were unlike it in no other respect, had two well developed accessory spines. Therefore, *arcticus* and *americanus* merge together.

Comparing *arcticus* directly with *niger*, the former, when it has one accessory spine, agrees to that extent with the latter; the teeth on each superior claw of *arcticus* are not known to be less than four, and

are only two in typical *niger*; as I have implied, however, *arcticus* is connected with *niger* through *americanus*; in fact, the variety of *arcticus* with two basal spines might be called *americanus*, were its true relations with *arcticus* not known.

The dental scales also, occurring in no other described species except *T. plumbeus*, are of significant value.

To summarize: *arcticus* varies into *americanus* which, in turn, connects insensibly with *niger*. The first two, then, are properly to be called varieties of *niger* (*flavescens*)—the first described of the three. The question whether *niger* is actually nearest the stem form—a debatable subject, which I have but partially settled—fortunately does not affect the terminology to be adopted.

Although *niger* has long been known to occur throughout Europe under the name of *flavescens*, it has not been hitherto recorded from the Arctic regions.

TOMOCERUS NIGER Bourl., var. ARCTICUS Schött.

(Pl. VIII, figs. 48-52.)

Tomocerus arcticus SCHÖTT, K. sven. vet. akad. hand., XXV, No. 11, p. 43, taf. 3, figs. 8, 9, 1894.—DALLA TORRE, Die Gattungen und Arten der Apterygogenea (Brauer), p. 11, 1895.—SCHÄFFER, Fauna Arctica, 1, lief. 2, p. 251, 1900.

Typical *arcticus* is citron yellow, when denuded of scales. Eyes six on either side (fig. 48), as usual. Antennæ over three times as long as the head, or two-thirds the length of the body; segments related as 2 : 3 : 13 : 3; basal ring purple; first two segments yellow, second often purplish distally; last two pale purple. Prothorax concealed; remaining segments related in length as 8 : 6 : 5 : 6 : 9 : 6 : 3 : 2. Legs yellow throughout, or else coxæ and tibiæ purplish; superior claws (fig. 49) rather stout, slightly curved, pseudonychiate; inner margin distinctly quadridentate, as a rule; superior claws of hind feet one-third longer than those of the other feet; inferior claws two-thirds as long as the large claws, lanceolate, acute, inner margin unidentate two-fifths from the apex; tenent hair knobbed. Furcula attaining the ventral tube; segments as 5 : 7 : 1, in relative lengths; manubrium yellow, remainder white. Dental spines (fig. 50) normally six or seven on either side, becoming successively smaller proximally; distal spine more lateral than the rest; two large ovate-lanceolate acuminate transparent scales occur near the manubrium. Clothing as in *T. niger*, type. Length, 3.5 mm.

One specimen, Popof Id., 1899 (No. 96); four, Cook Inlet, 1899

(No. 60); nine, Sitka, June, 1899 (Nos. 64, 71); one, Yakutat Bay, 1899 (No. 69); fifty-five, including intergrades with *niger* and *americanus*, Muir Glacier, west side, June 12, 1899 (No. 63).

In *arcticus* there is a strong tendency toward a double series of dental spines, a peculiarity limited to *arcticus*, so far as I know. The nature of the doubling is shown in fig. 51, in which certain of the proximal spines are each laterally accompanied by an extra spine. The addition of spines begins at the base of the series and proceeds distally; in fig. 52, only the basal spine of the right dens is repeated, the remaining spines being single.

There is no question about the identity of these specimens. Four is the normal number of teeth for a superior claw, as Schött says; on one pair of hind feet I found five on the right and four on the left foot, a variation mentioned by Schött. He neither describes nor figures a tooth for the inferior claw; such a tooth was distinct on most of the Harriman specimens, however, although occasionally obscure or even absent, especially on small individuals. The dental spines, rarely eight, in a normal series, were as often six as seven. The number of spines increases with the size of the individual. I may add that the dental scales disagree with Schött's figure by being acuminate instead of rounded.

The preceding description is based upon nearly typical specimens. To describe the varieties of *arcticus* would be to describe *niger* and *americanus* again, as *arcticus* varies into both those forms. The presence of an accessory spine beside each scale and a slight reduction in the number of teeth for the superior claw, variations which actually occur in the specimens from the Muir Glacier—transform *arcticus* into *niger*. The variations leading into *americanus* are given below and I have already shown (p. 99) that between *americanus* and *niger* proper, no natural distinctions exist.

Since its discovery by the Vega Expedition in 1878-79, *arcticus* has never been recorded. The types occurred in colonies at Pitlekai, Chukchi peninsula, eastern Siberia.

TOMOCERUS NIGER Bourl. var. AMERICANUS Schött.

(Pl. VIII, fig. 53.)

Tomocerus americanus SCHÖTT, Proc. Cal. Acad. Sci., VI (2), p. 172, pl. 16, figs. 6, 7, 1896.

Among the many specimens of typical *arcticus* from the Muir Glacier are several which agree with *arcticus* in every respect save that

the dental spines are nine to eleven on either side, there being one or two large additional spines near the dental scale, as in fig. 53. The same varieties, which also occurred frequently with typical examples of *niger*, are evidently *americanus* Schött (1896, p. 172) which, indeed, was described as being a very variable species. The interrelations of *americanus* and *niger* I have discussed on p. 99.

Occurred among fifty-five specimens of *arcticus* and *niger*, Muir Glacier, west side, June 12, 1899 (No. 63); also at Cook Inlet (No. 60) with typical *niger*.

PAPIRIUS PALMATUS sp. nov.

(Pl. VIII, figs. 54-56.)

Pale yellow, laterally washed with purplish, or else blackish-purple, with pale rounded lateral spots; face with a broad median purple stripe. Eyes (fig. 54) eight on either side, on large black patches. Antennæ slightly shorter than the body, purple, paler basally; third segment with six annulations behind the swollen apex; fourth lanceolate, with two annulations below the middle. Superior claws (fig. 55) long, slender, tapering, feebly curving, outer surface unidentate two-fifths from the apex; inner margins with a pair of teeth at about one-fourth, and a second pair at one-half the distance from the apex (only two teeth show in a profile aspect of the claw); inferior claw two-thirds as long as the other, lanceolate, acuminate, with a stout knobbed subapical tenent hair as long as the claw itself, and with a long stiff basal spine borne on the rounded inner margin; an extra long subapical hair occurs on the tibia. Furcula white, attaining the mouth; segments related as 3:5:2; dentes each with a lateral series of stiff setæ, of which the proximal alone is simple, the others becoming successively shorter and serrately compound (fig. 56); all the setæ are simple, though, in small individuals; mucrones (fig. 56) long, slender, concave, with twenty to thirty rounded teeth on either margin. Dorsum clothed with numerous short stiff setæ and several long spinous hairs; stiff setæ on antennæ and legs. Maximum length, 2.24 mm.

Type.—Cat. No. 5434, U. S. Nat. Museum.

Described from twenty-four types: thirteen, Sitka, June, 1899 (Nos. 64, 71); six, Yakutat, June, 1899 (Nos. 57, 58); three, Berg Bay, June 10, 1899 (No. 72); one, Kodiak (No. 65); one, Fox Point, July, 1899 (No. 67).

Papirius palmatus is most nearly allied to *P. ater* L. (Tull. 1871, p. 146; 1872, p. 34, taf. 3, figs. 26-36).

MACHILIS ARCTICA sp. nov.

(Pl. v, figs. 6-10; Pl. VIII, figs. 57, 58.)

Body (fig. 6) annulated with alternating bands of dark brown and pale yellow. Head colored as represented in fig. 57. Eyes circular in outline, contiguous along one-fifth the inner margin, or for a distance equal to about one-third the diameter of an eye. Antennæ one-quarter longer than the body; hairs white; the basal ring and the following seven segments are, in relative lengths, as 5:25:10:7:3:4:2:4; basal ring (fig. 7) yellow, bordered with brown; basal segment cylindrical, twice as long as broad, brown; remaining segments yellow, obscurely banded with brown. Maxillary palpi (fig. 8) seven-jointed, as usual, with segments related as 4:5:5:8:8:7:6; first segment constricted near the base, with a lateral finger-like process and a globose apex; remaining segments simple, cylindrical, yellow, with the following brown markings (fig. 8): A basal patch on segment two, a distinct basal ring on segment four, a diffuse basal ring on segments five and six and a subapical patch on segment five. Labial palpi (fig. 9) with segments related as 3:5:5; first segment brown, clavate, with a short apical process; second yellow, cylindrical, three times as long as it is broad; third yellow, strongly clavate. Body slender; the relative lengths of the successive segments, measured along the median dorsal line, are 9:18:10:10:9:7:9:10:11:11:11:10:7; thorax feebly arched; coxæ (fig. 10) brown; trochanter yellow; femur brown, with yellow apex; tibia brown; tarsus brown, basally and apically; claws and cerci brown. Median cercus one-quarter longer than the body, or nearly as long as the antennæ; lateral cerci nearly one-third as long as the median cercus. From a perfect specimen were taken the following measurements of relative lengths: body, 8; antennæ, 11; median cercus, 10; lateral cerci, 3.

The scales are so variable in size and form as to be of no specific value, at least in this species; the cuticular figures, however (fig. 58), will assist in distinguishing this form. Length, 8 mm.

Type.—Cat. No. 5433, U. S. Nat. Museum.

Nine types: three, Muir Glacier ("hillside to right"), June 11, 1899 (No. 68); five, Popof Island, 1899 (Nos. 59, 66); one, Sitka, June, 1899 (No. 61).

I have found no species to which *M. arctica* is closely allied. Its most distinctive characters are the relative lengths of body, antennæ and cerci, the coloration of the head, form and position of the eyes and the color and form of the antennal and palpal segments.

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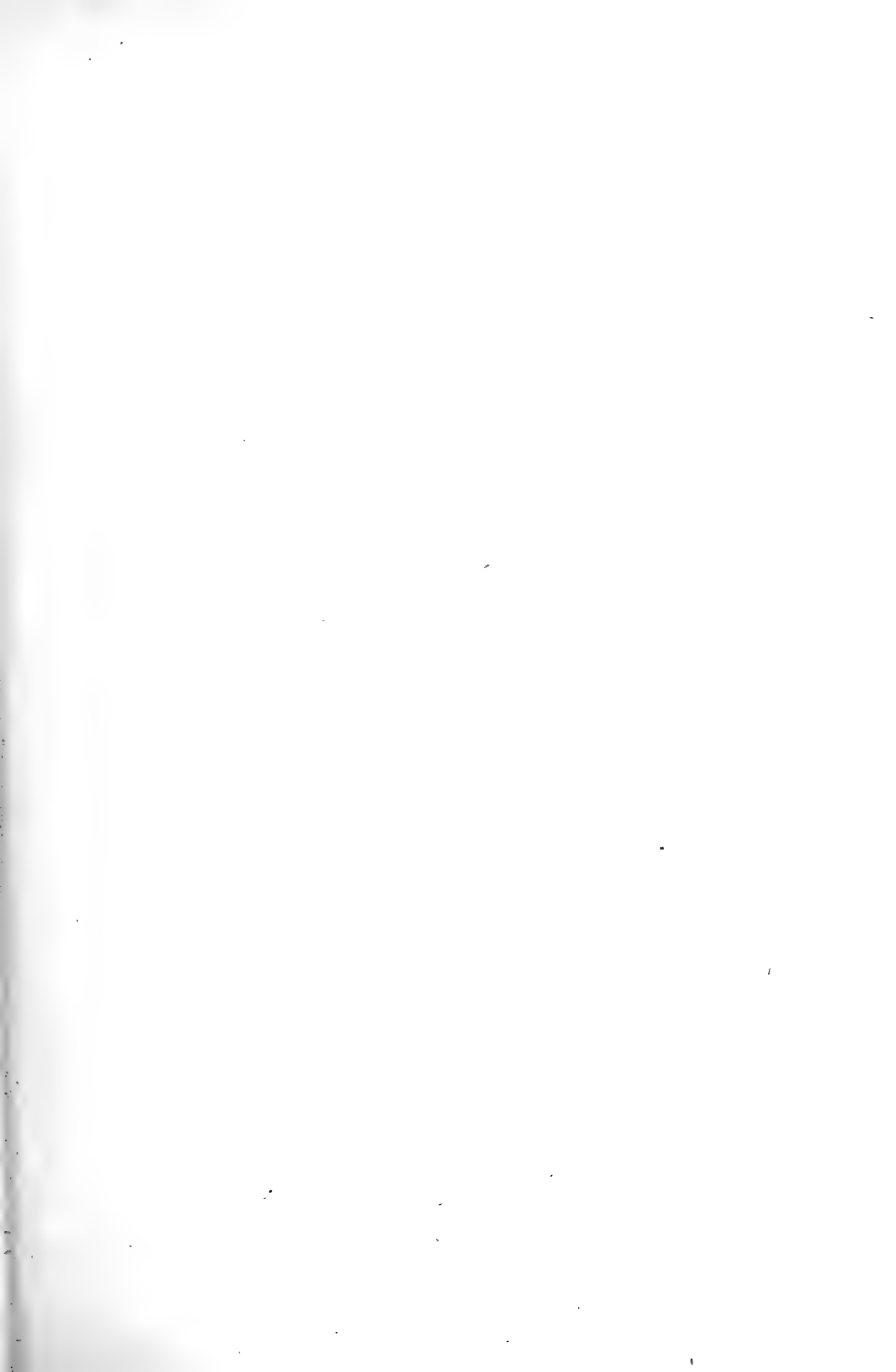


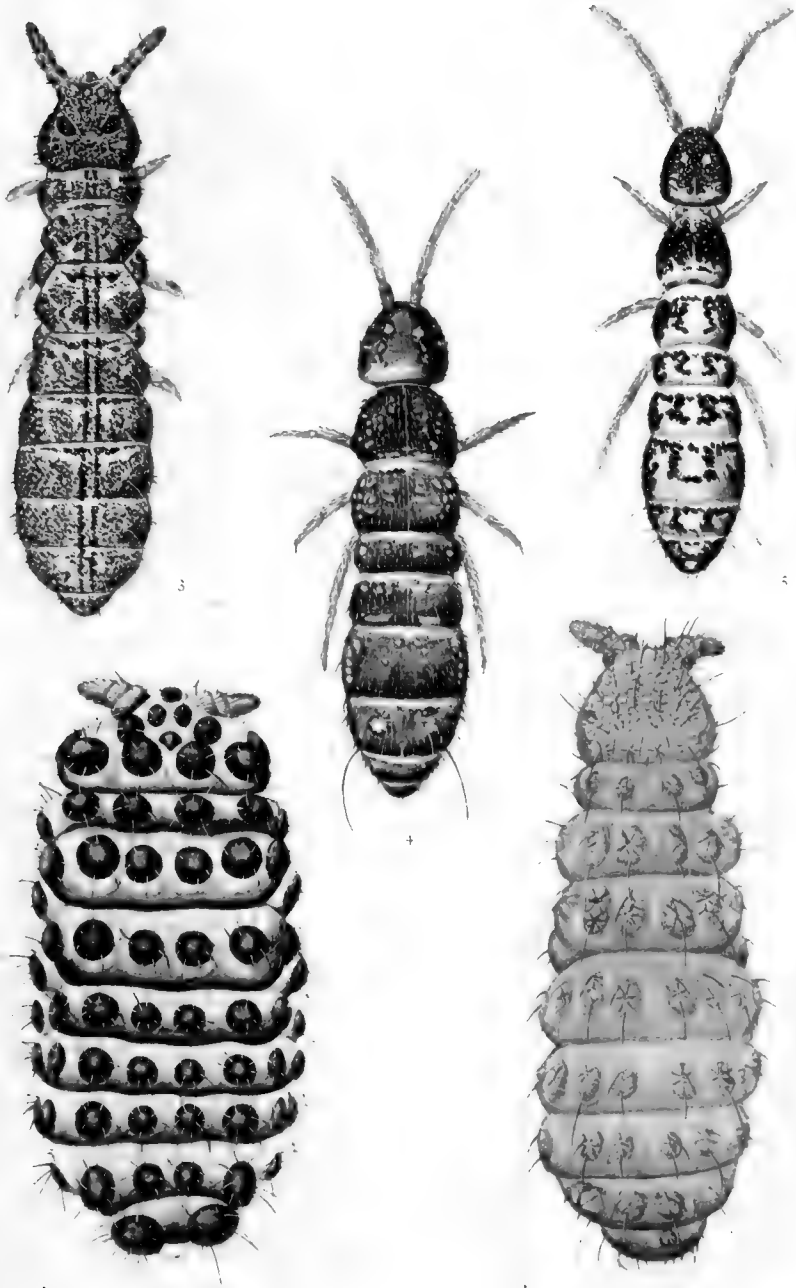
PLATE VI.

[Proc. Wash. Acad. Sci., Vol. IV, Pl. IV.]

- FIG. 1. *Neanura gigantea* Tull. ($\times 20$).
2. " *ornata*, sp. nov. ($\times 60$).
3. *Anurida amorita*, sp. nov. ($\times 18$).
4. *Isotoma viridis* Bourl., type ($\times 13$).
5. " " " var. *arctica* Schött ($\times 12$).

[108]

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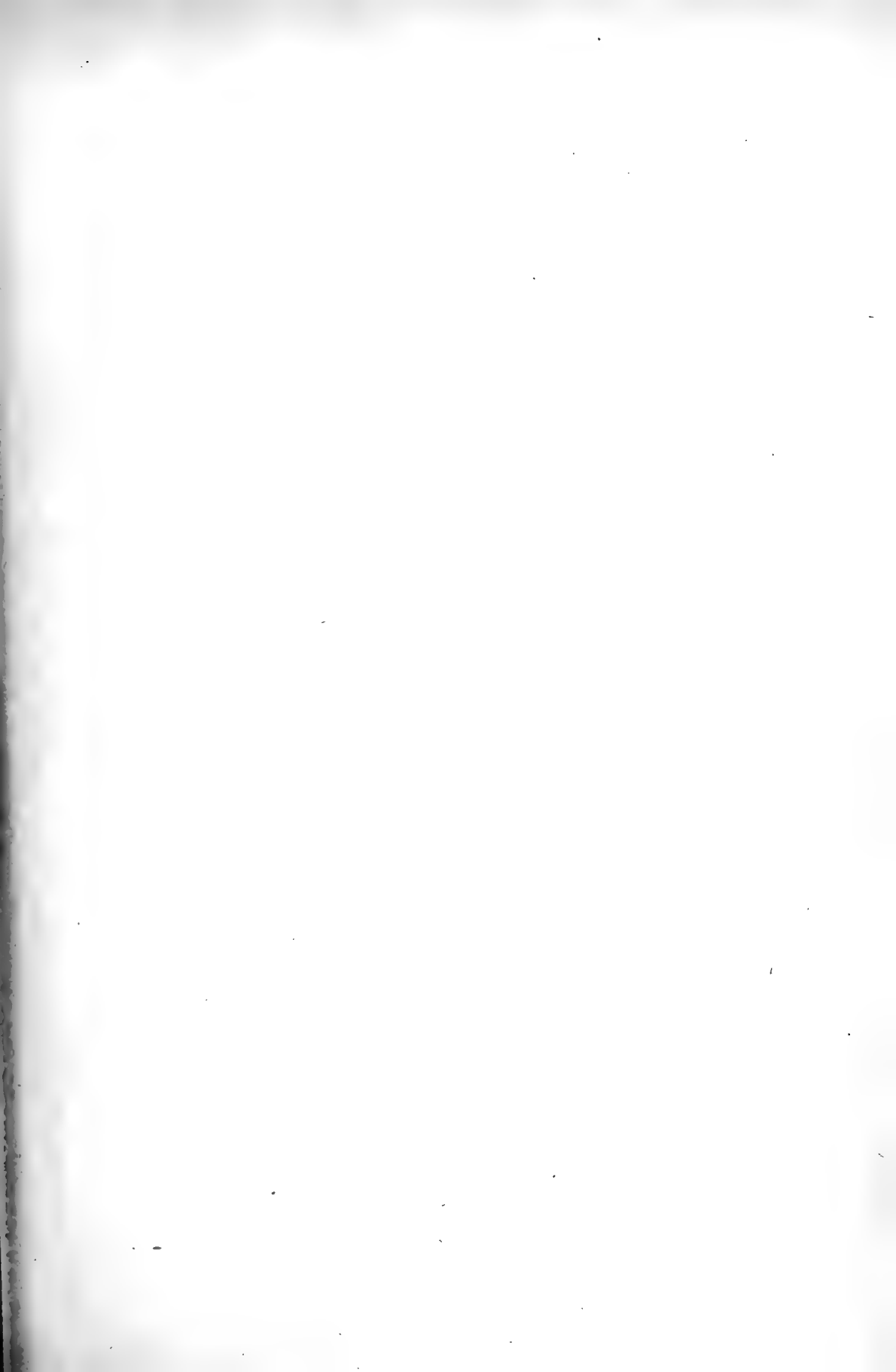


PLATE VII.

[Proc. Wash. Acad. Sci., Vol. IV, Pl. V.]

FIG. 6. *Machilis arctica*, sp. nov. ($\times 8$).

- | | | | | | |
|-----|---|---|---|---|--|
| 7. | " | " | " | " | antenna ($\times 30$). |
| 8. | " | " | " | " | left maxillary palpus ($\times 30$). |
| 9. | " | " | " | " | right labial palpus ($\times 30$). |
| 10. | " | " | " | " | left mid leg ($\times 30$). |



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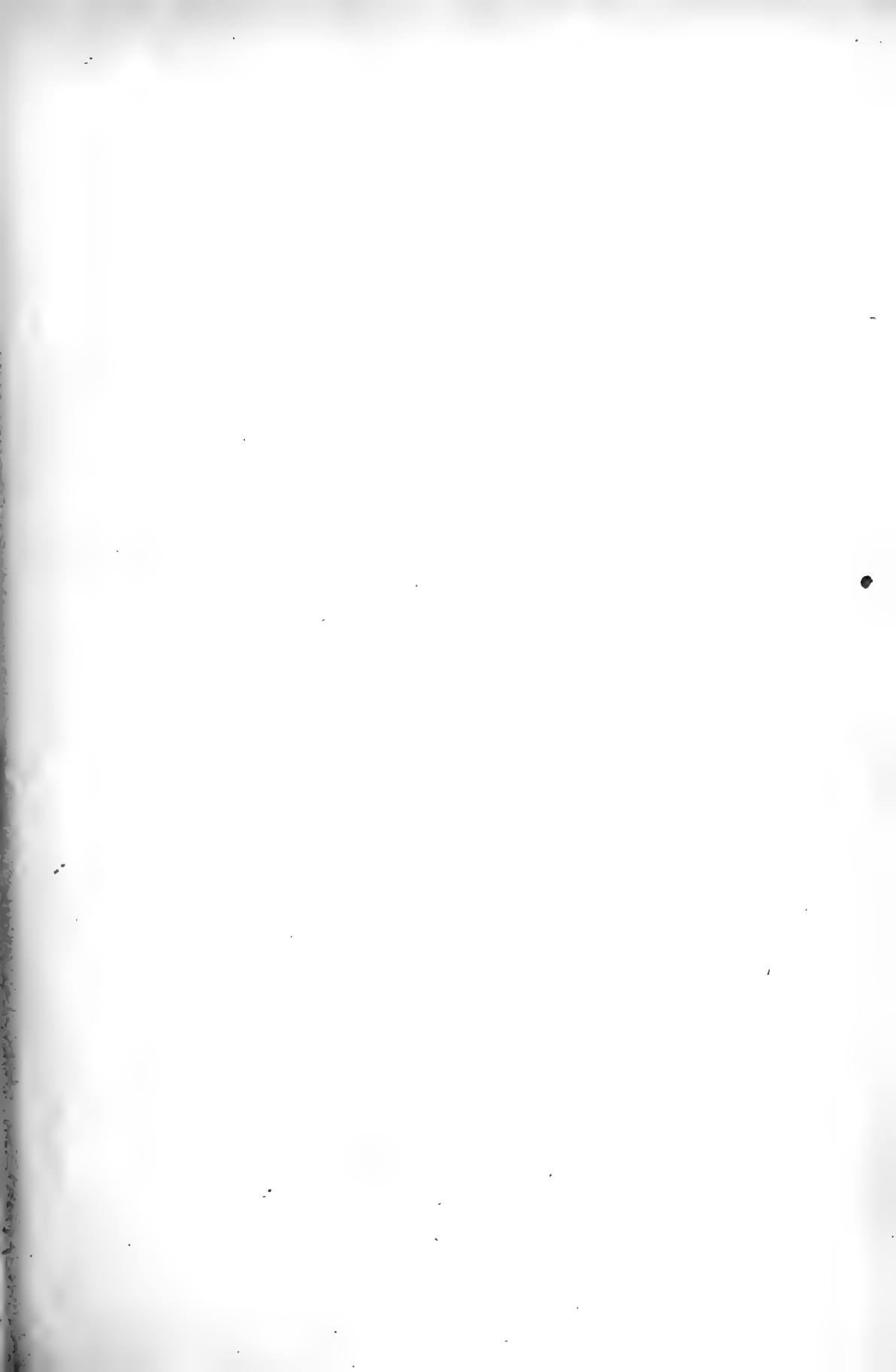
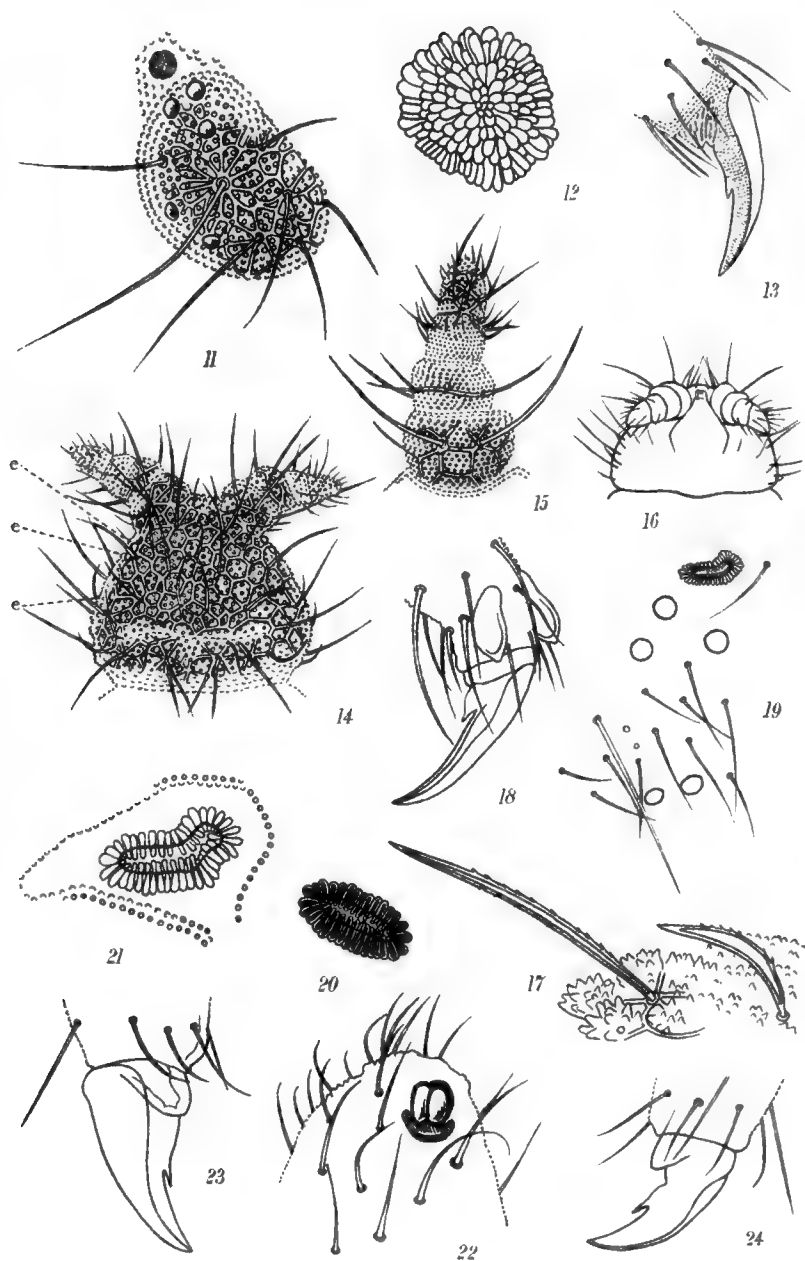


PLATE VIII.

[Proc. Wash. Acad. Sci., Vol. IV, Pl. VI.]

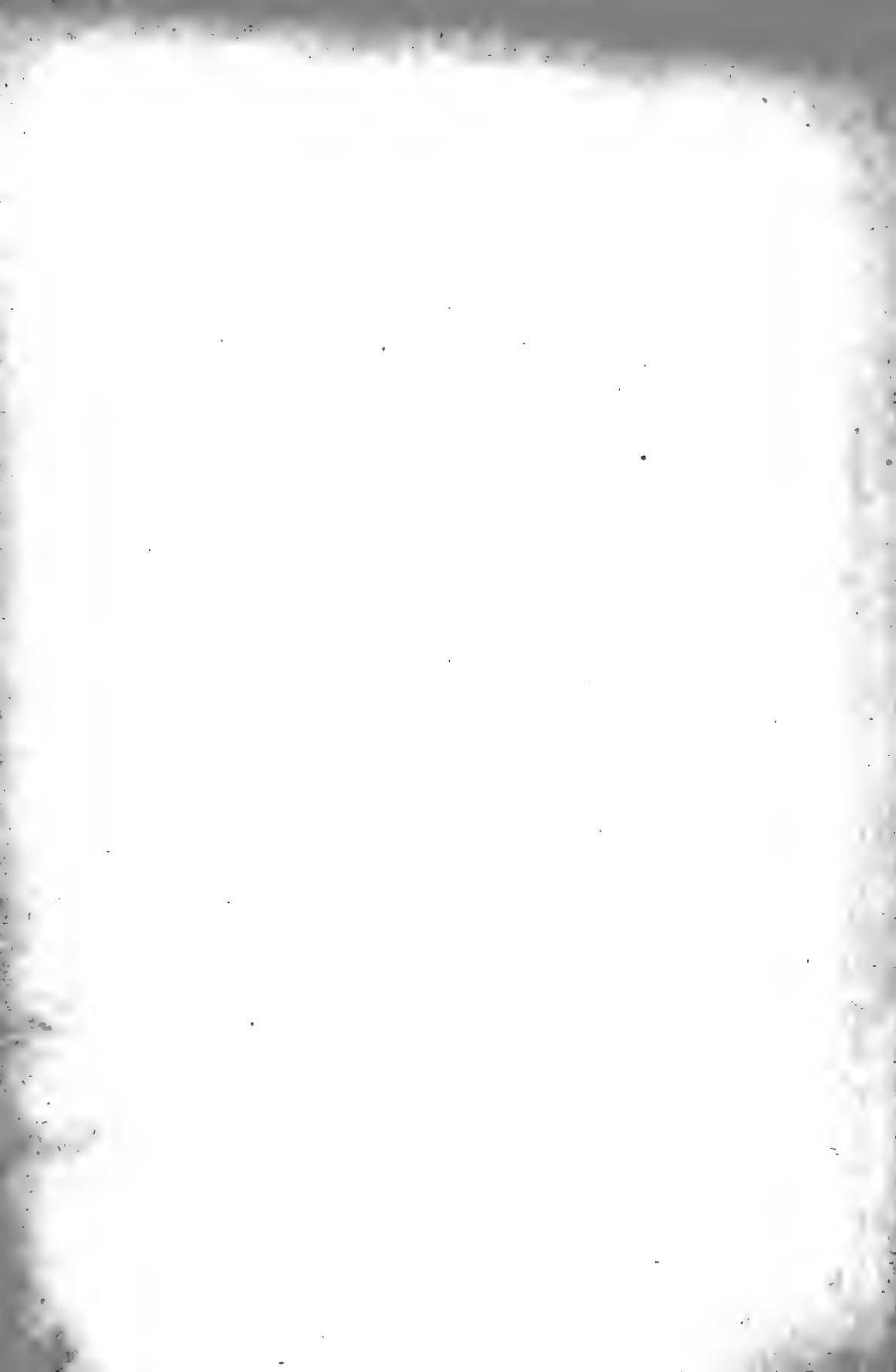
- FIG 11. *Neanura gigantea* Tull.; eyes of left side ($\times 127$).
12. " " " left postantennal organ ($\times 434$).
13. " " " left aspect of hind foot ($\times 99$).
14. " *ornata* sp. nov.; head; eyes indicated by *e, e, e* ($\times 99$).
15. " " " left aspect of left antenna ($\times 127$).
16. " " " ventral aspect of head ($\times 60$).
17. " " " metanotal setæ ($\times 434$).
18. " " " right aspect of left fore foot ($\times 367$).
19. *Anurida amorita* sp. nov.; eyes and postantennal organ of right side ($\times 200$).
20. *Anurida amorita* sp. nov.; left postantennal organ ($\times 434$).
21. " " " right " " ($\times 434$). (figs. 20 and 21 are from the same individual.)
22. *Anurida amorita* sp. nov.; dorsal aspect of right antennal organ ($\times 367$).
23. *Anurida amorita* sp. nov.; left mid foot ($\times 200$)
24. " " " right aspect of right fore foot ($\times 300$).
- [112] (110)



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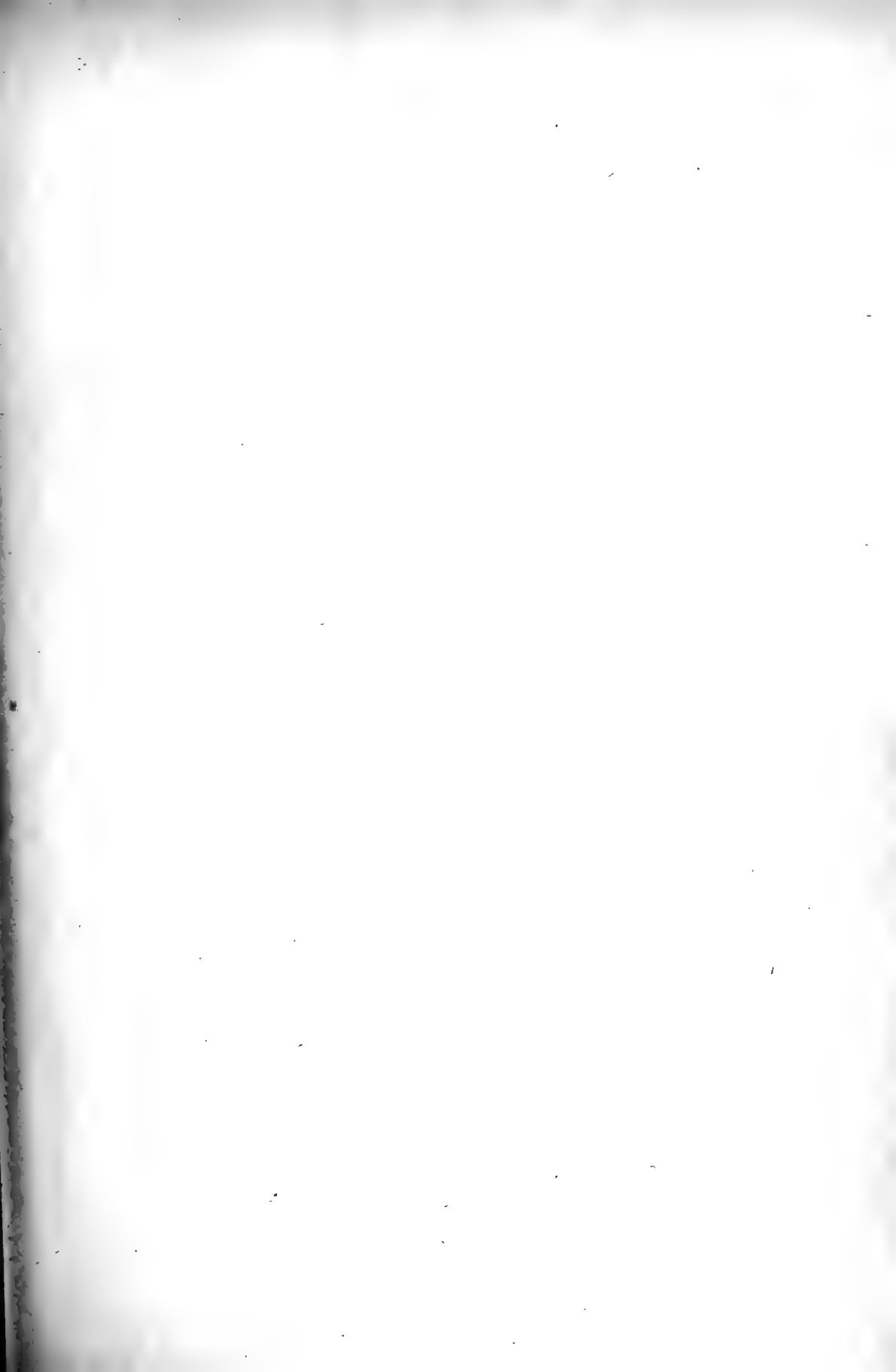
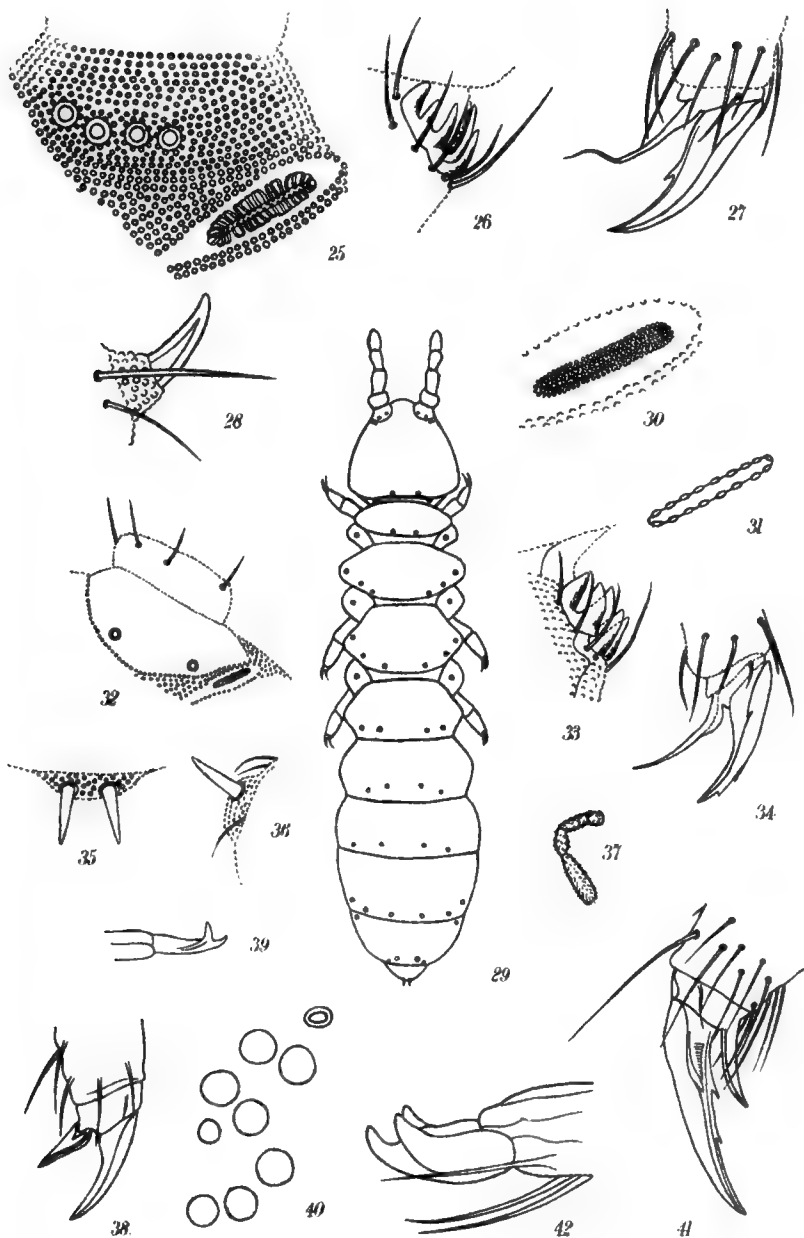


PLATE IX.

[Proc. Wash. Acad. Sci., Vol. IV, Pl. VII.]

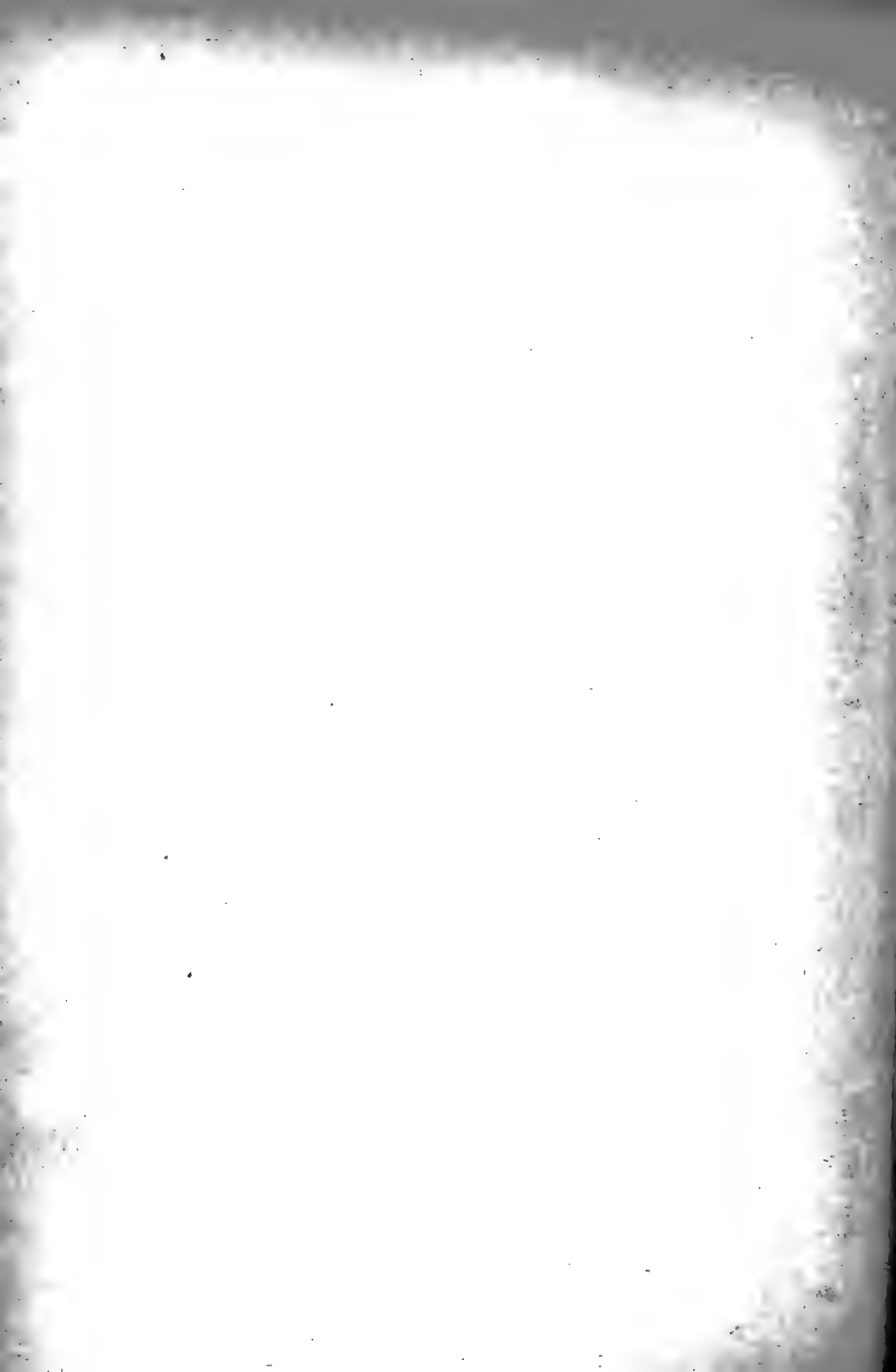
- FIG. 25. *Aphorura octopunctata* Tull.; right postantennal organ, etc. ($\times 367$).
 26. " " " dorsal aspect of right antennal organ ($\times 434$).
 27. *Aphorura octopunctata* Tull.; left aspect of left hind foot ($\times 367$).
 28. " " " left aspect of left anal spine ($\times 357$).
 29. " *dentata* sp. nov.; represents arrangement of dorsal pseudocelli ($\times 20$).
 30. *Aphorura dentata* sp. nov.; right postantennal organ ($\times 434$).
 31. " " " " deeper structure of postantennal organ ($\times 434$).
 32. *Aphorura dentata* sp. nov.; base of right antenna ($\times 127$).
 33. " " " " dorsal aspect of right antennal organ ($\times 434$).
 34. *Aphorura dentata* sp. nov.; left aspect of right hind foot ($\times 200$).
 35. " " " " dorsal aspect of anal spines ($\times 200$).
 36. " " " " right aspect of right anal spine ($\times 200$).
 37. *Isotoma fimetaria* (L.) Tull.; antenna ($\times 60$).
 38. " " " " left aspect of right hind foot ($\times 434$).
 39. " " " " left mucro ($\times 434$).
 40. " *viridis* Bourl., var. *arctica* Schött; eyes and postantennal organ of right side ($\times 200$).
 41. *Isotoma viridis* Bourl., var. *arctica* Schött; left aspect of left fore foot ($\times 200$).
 42. *Isotoma viridis* Bourl., var. *arctica* Schött; right aspect of right mucro ($\times 434$).



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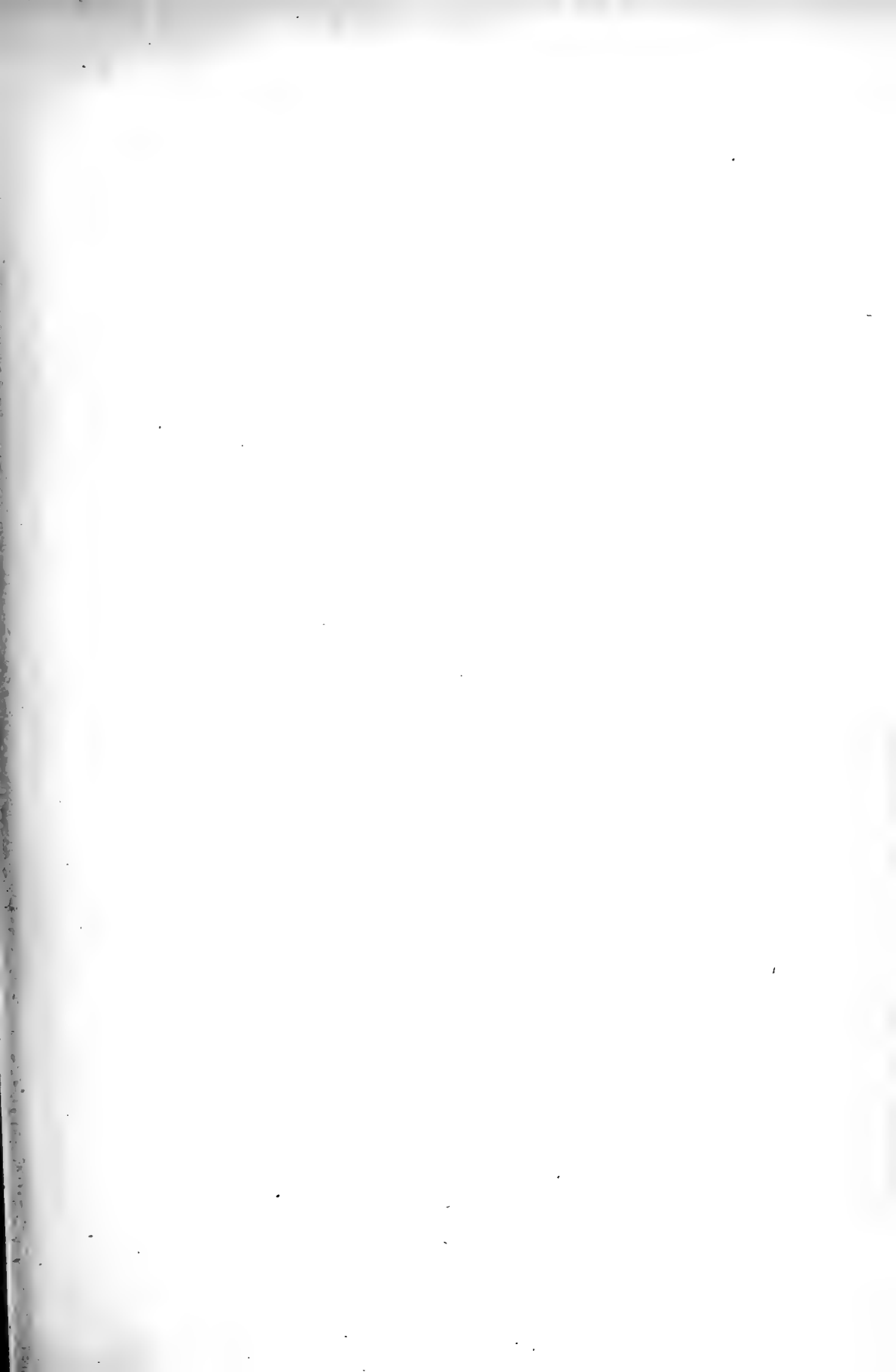
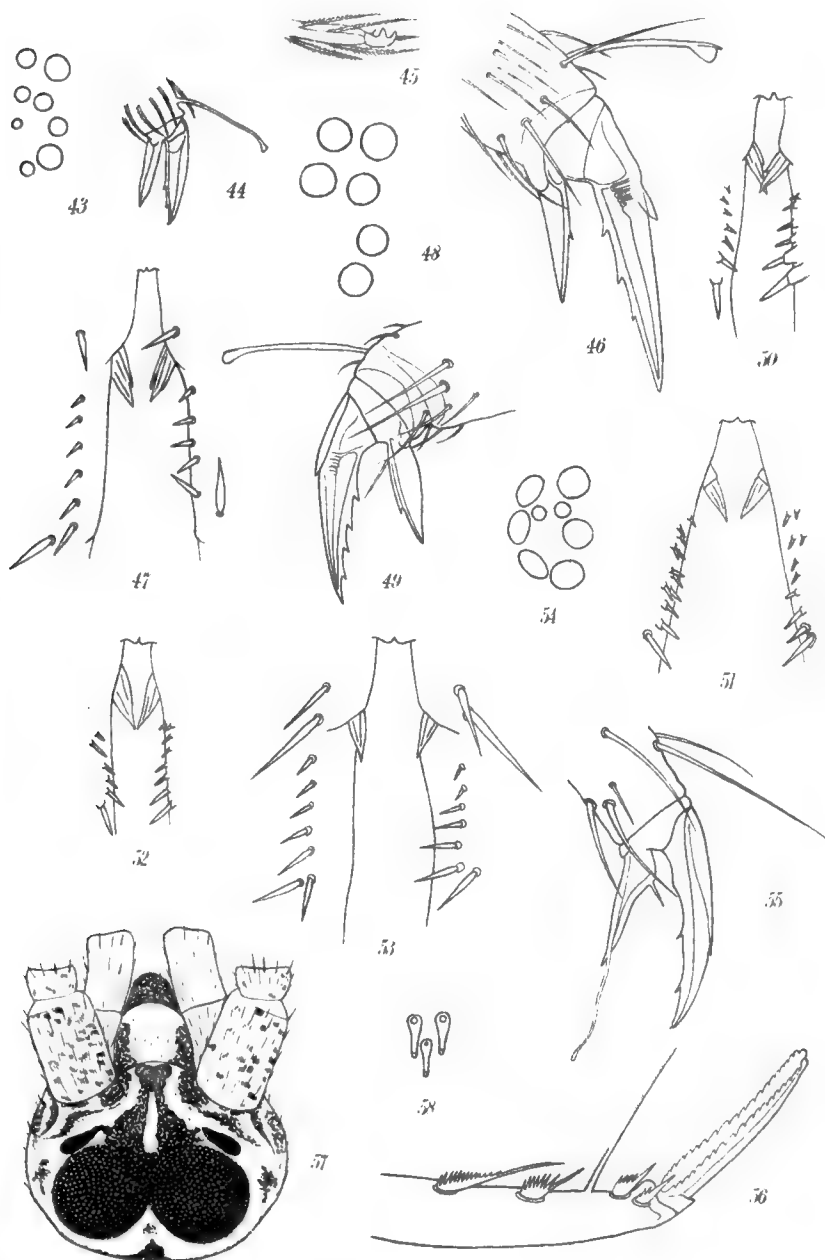


PLATE X.

[Proc. Wash. Acad. Sci., Vol. IV, Pl. VIII.]

- FIG. 43. *Entomobrya kincaidi* sp. nov.; eyes of right side ($\times 374$).
44. " " " " left aspect of left hind foot ($\times 434$).
45. " " " " left aspect of left mucro ($\times 434$).
46. *Tomocerus niger* Bourl., type; right aspect of right fore foot ($\times 367$).
47. " " " " dental spines ($\times 200$).
48. " " " var. *arcticus* Schött; eyes of right side ($\times 367$).
49. " " " " " " right aspect of left hind foot ($\times 367$).
50. *Tomocerus niger* Bourl., var. *arcticus* Schött; dental spines ($\times 200$).
51. " " " " " " doubled dental spines ($\times 200$).
52. *Tomocerus niger* Bourl., var. *arcticus* Schött; dental spines slightly abnormal ($\times 200$).
53. *Tomocerus niger* Bourl., var. *americanus* Schött; dental spines ($\times 200$).
54. *Papirius palmatus* sp. nov.; eyes of left side ($\times 127$).
55. " " " " left aspect of left hind foot ($\times 367$).
56. " " " " left aspect of left mucro, etc. ($\times 200$).
57. *Machilis arctica* sp. nov.; dorsal aspect of head ($\times 28$).
58. " " " " cuticular figure ($\times 434$).



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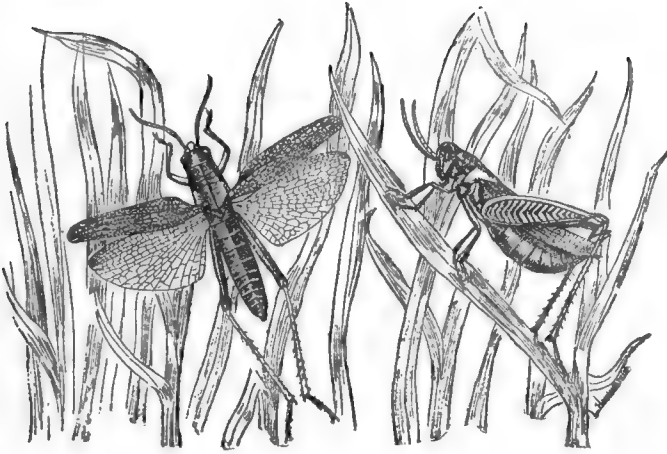
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ALASKA APTERYGOTA

ORTHOPTERA OF THE EX-
PEDITION

The following paper on the Orthoptera of the Expedition, by A. N. Caudell, Division of Entomology, U. S. Department of Agriculture, was originally published in the Proceedings of the Washington Academy of Sciences, vol. 11, pp. 511-512, Dec. 20, 1900. It is here reprinted from the same electrotype plates, so that it may be quoted exactly as if it were the original. The original pagination has been preserved and transferred to the inner or hinge side of the page, where it is enclosed in brackets, thus [512]; while the consecutive pagination of the present volume has been added in the usual place. The present headpiece and title have been substituted for the running heading of the Academy's Proceedings and the original title, which was: *Papers from the Harriman Alaska Expedition. xv. Entomological Results (9): Orthoptera.* No other alterations have been made.

EDITOR.



ORTHOPTERA OF THE EXPEDITION

BY A. N. CAUDELL

THE large collection of insects obtained during the Harri-man Alaska Expedition by Professor Kincaid contained only a single species of Orthoptera, as follows:

Melanoplus borealis Fieber.

Melanoplus borealis FIEBER, Lotos, III, p. 120, 1853.—SCUDDER, Rev. Melanop., p. 270, 1897.

Professor Kincaid secured five adults, three males and two females, and nine nymphs, at Kukak Bay, Alaska Peninsula (July 3, 1899). They were all taken within a few feet of a small pool in a sphagnum swamp. This pool, which was about ten feet in diameter, was surrounded by a miscellaneous vegetation, in which the locusts lived. The specimens were captured by causing them to leap into the water, when they were easily secured. They were preserved in spirits. A large scope of country surrounding this spot was carefully gone over by the collector during the succeeding fortnight and many similar pools visited, but not another locust was seen. This would indicate that this species is quite local in its occurrence.

The nymphs, which are apparently in the last stage, usually have the outer surface of the posterior femora wholly black on the basal two-thirds, generally relieved by two oblique pale bands, and the inner surface marked by two oblong fuscous spots.

This species has been recorded from the Northern United States, Labrador, Greenland, and Norway.

APHIDIDÆ OF THE EX-
PEDITION

The following paper on the Aphididæ of the Expedition, by Theo. Pergande, was originally published in the Proceedings of the Washington Academy of Sciences, vol. 11, pp. 513-517, Dec. 20, 1900. It is here reprinted from the same electrotpe plates, so that it may be quoted exactly as if it were the original. The original pagination has been preserved and transferred to the inner or hinge side of the page, where it is enclosed in brackets, thus [514]; while the consecutive pagination of the present volume has been added in the usual place. The present headpiece and title have been substituted for the running heading of the Academy's Proceedings and the original title, which was: *Papers from the Harriman Alaska Expedition. xvi. Entomological Results (10): Aphididæ*. No other alterations have been made.

EDITOR.



APHIDIDÆ OF THE EXPEDITION

BY THEO. PERGANDE

THIS paper is based upon a small collection of plant lice obtained in Alaska by Professor Trevor Kincaid during the Harriman Expedition in 1899.

The material thus brought together comprises four species, one of them European, while the remaining three appear to be new; at least I failed to identify them with any of our described forms. It is greatly to be regretted that the migratory female was obtained with only two of them, that no colorational notes were made of the living insects before immersion in alcohol, and that no attempt was made to ascertain the name of the host plants on which they were feeding. The descriptions of the new species will therefore be rather defective and incomplete, though I hope they will enable future students to recognize them.

NECTAROPHORA CAUDATA sp. nov.

Winged viviparous female: general color apparently green or yellowish green. Antennæ black; the two basal joints dusky, their base and base of the third pale. Eyes brown. The head, a somewhat lunate spot at the posterior margin of the prothorax, the mesothoracic

lobes and sternal plate, posterior margin of the scutellum, two small roundish spots on the metathorax, a transverse row of three small linear spots on the first abdominal segment, a narrow, transverse band about the middle of the abdomen, a dorso-lateral row of three transverse spots in front of and two smaller spots between the nectaries of a brownish or dusky coloration. Legs brownish yellow, base of femora greenish yellow; both the femora and tibiæ change gradually to a darker brown towards the apex. Tarsi black. Nectaries and tail concolorous with the abdomen, with tip of nectaries blackish. The wings were very much mutilated, though the subcosta appears to have been greenish or greenish yellow at base and shading gradually to brownish yellow towards the stigma, which appears to have been greenish or yellowish green; veins black.

Length of body about 3.4 mm.; expanse of wings about 10 mm.; length of antennæ almost 4 mm.; of the nectaries nearly 0.4 mm.; and of the tail a little over 0.2 mm. The two basal joints of the antennæ, as usual, shortest, each of them slightly over 0.1 mm., the first one being slightly the longest; the third joint measures 0.8 mm. in length, the fourth nearly 0.7, the fifth a little over 0.5 mm., and the sixth with its spur 1.2 mm. in length. The hairs of the antennæ and abdomen are very short, simple and sparse, while those of the tibiæ are prominent and spine-like. The nectaries are slightly tapering and much shorter than usual in this genus, not reaching to the end of the body, while the tail is unusually broad and but slightly constricted beyond the middle.

Apterous female: General coloration similar to that of the winged form; eyes brown, antennæ black, the two basal joints pale, the third joint brownish. Legs and nectaries brownish yellow, base of femora greenish, apex of the tibiæ, of the nectaries and the tarsi black. There are no markings on the abdomen, except a dorso-lateral row of five or six minute, impressed, dusky dots each side in front of the nectaries.

Length, 3.6 to 4 mm. to the tip of the tail; antennæ rather short, barely reaching to nectaries and about 3 mm. in length. The third joint measures almost 0.7 mm., the fourth somewhat over 0.4 mm., the fifth 0.4 mm., and the sixth with its spur 0.8 mm. in length. There are from one to four small sensoria a little above the base of the third joint. The nectaries and tail are subequal in length, or with the tail, as in some specimens, distinctly longer than the nectaries; the tail measures about 0.4 mm. in length and is much broader than in the winged form.

The winged form of this species resembles, on account of the mark-

ings of its abdomen, *Nectarophora granaria* Kirby; it is, however, larger, with much shorter nectaries and much broader tail, while the apterous form, on account of the short nectaries comes near *Nectarophora fulva* Oestl., though it is considerably larger and differs besides in the conspicuously broad tail.

Taken at Juneau, Alaska.

Type.—Cat. no. 5274, U. S. National Museum.

NECTAROPHORA INSULARIS sp. nov.

Apterous female: General color evidently green. Eyes brown; antennæ black, the two basal joints, and the basal two-thirds or more of joints three and four pale. Legs pale, the coxæ brown, apex of tibiæ, the tarsi and the tip of nectaries dusky to black. The body is marked with a subdorsal row of nine small dusky spots, of which those on the prothorax and mesothorax are elongated; there are also two mediodorsal spots on the metathorax; four still smaller dorso-lateral spots in front of nectaries and four minute ventro-lateral spots. In some of the immature specimens the nectaries are almost black.

Length of body to tip of tail 3 to 3.4 mm., antennæ rather long, reaching to or beyond tip of tail and about 4 mm. in length. Length of nectaries 0.7 to 0.8 mm.; tail about 0.3 mm. Length of third antennal joint about 0.7 mm.; fourth joint 0.6 mm.; fifth joint 0.5 mm., and the sixth, with its spur, 2 to 3 mm. in length, the spur being much longer than joint three. The first joint is very stout and almost twice the length of the second; the third joint is provided with one to three small sensoria near its base. Nectaries slender, slightly tapering and curving outwards. Hairs of antennæ minute and simple, those of the tibiæ stout and spine-like, a few of them sometimes slightly thickened at the tip.

This species resembles somewhat *Nectarophora pisi* Kalt., but is much larger, the legs shorter and stouter, the nectaries shorter and the tail broader.

Obtained on St. Paul Island, Bering Sea.

Type.—Cat. no. 5275, U. S. National Museum.

NECTAROPHORA EPILOBII sp. nov.

Apterous female: Color apparently dark reddish or brownish. Eyes brown. Head, antennæ, nectaries, coxæ, terminal third of femora and tibiæ, the tarsi and anal lobes black, remaining parts of legs dark yellowish; tail yellow. There is a black or dusky band on the

prothorax and mesothorax, a longitudinal dusky mark each side of the mesothoracic band, transverse rows of minute black dots on the abdomen, and a large black spot at the base of the nectaries posteriorly.

Length of body, exclusive of the tail, 3 to 3.4 mm. Length of antennæ 3.5 mm.; nectaries 0.7 mm.; tail 0.6 mm. The third joint of the antennæ measures 1.2 mm.; the fourth joint 0.6 mm.; the fifth 0.5 mm., and the sixth, with its spur, 1.2 mm.

The third antennal joint is provided with a row of nine to ten prominent sensorial tubercles near its basal one-third. Nectaries stout and tapering; tail prominent, almost as long as nectaries, densely covered with sharp points and provided each side with five or six small notches, which give rise to a fine, long and curved hair. Hairs of antennæ and legs stout and spine-like, those of the body rather long, slender and simple.

In general appearance this species resembles very much *Nectarophora millefolii* Fab., but is larger and not so hairy as that species.

Found upon a species of *Epilobium* on Popof Island, Alaska.

Type.—Cat. no. 5276, U. S. National Museum.

CLADOBIUS POPULEUS Kalt.

Cladobius populeus KALT., Monog. d. Pflanzenl., 1, p. 116, 1843. (*Aphis*.)

While studying this handsome species and comparing it with the descriptions by Kaltenbach and Koch, I became convinced that it was identical with that described by these authors, notwithstanding both of them speak of the nectaries as being cylindrical, whereas, in fact, they are clavate. This error, or discrepancy was evidently due to the fact that the nectaries of this and probably some other species of this genus are rather more slender than usual and when being carried parallel to the sides of the abdomen, appears to be more or less distinctly cylindrical, whereas, in projecting obliquely from the sides of the body their clavate character becomes quite plain. In many of the species of this genus the nectaries are unusually robust and conspicuously clavate, while in others this character becomes less and less pronounced and may easily lead to errors.

Besides this oversight, Koch made evidently additional errors while drawing up his diagnosis of this genus, which, no doubt, was due to impaired eyesight. One of the most notable instances is his statement that joints four to six are of nearly equal length and that the, so-called, seventh joint is very small; in reality joints four, five, and the spur, or seventh joint, are, as stated by Kaltenbach, subequal in length,

whereas, as is usual in the higher groups of Aphidinæ, the sixth joint is shorter than either of these joints, and, since our Alaska insect agrees in coloration and other important characters, excepting the nectaries, with Kaltenbach's description, I take it for granted that it belongs to the same species.

It may be of interest in this connection to point out that *Pterocomma pilosa* Buckton, belongs also to this genus and that his *Pterocomma* has to be dropped. In examining the type specimen of *Pterocomma pilosa*, which had been kindly loaned me by Dr. Buckton for study, I was surprised to find that the principal character, the peculiar shape of the wings, on which this genus was founded, does not exist, but that it was the result of poor preparation, by which a peculiar fold along the third discoidal vein was formed, which can be readily traced by gently focusing this part of the wing.

It is quite possible that his species may belong to the same species; at least, it appears to come very near to it.

Additional studies of other genera with more or less distinctly clavate nectaries have convinced me that the genus *Melanoxanthus* Buckton has also to be dropped and that it must be made a synonym of *Cladobius*. The clavate character of the nectaries in different species varies considerably, so that it frequently may happen that the clavate character of rather slender nectaries is overlooked, especially if they lay parallel with, or close to the abdomen. The general appearance, however, of these insects, their rather large size, strong pilosity of the body and its members and the minute, blunt tail, will not fail, even if the exact shape of the nectaries cannot be ascertained, to assign them to their proper position.

The synonymy of this genus will therefore read:

CLADOBIUS Koch.

Melanoxanthus Buckton.

Pterocomma Buckton.

HOMOPTERA OF ALASKA



THE HOMOPTERA OF ALASKA

BY WILLIAM H. ASHMEAD

INTRODUCTION

THE insects of the suborder Homoptera found in Alaska, in comparison with those in the other orders taken by the Harriman Expedition, are few in number and somewhat disappointing, although they add considerably to our knowledge of the Alaska fauna. Few species of rhynchotous insects have been recorded from this territory, and our knowledge is most meager.

Dr. C. Stål, in a paper entitled 'Beitrag zur Hemipteren-Fauna Siberiens und des Russischen Nord-Amerika,' published in 1858,¹ was the first to record any species from Alaska.

In this contribution Dr. Stål enumerated, in all, 113 species, of which only thirteen came from Alaska, and nearly all of these were collected at Sitka. Substantially, this was all that was known of the fauna up to the date of the Harriman Expedition. Some of the Rhynchota taken by the Expedition have already been reported upon: (1) The Heteroptera, by O. Heideman; (2) the Psyllidæ, by E. A. Schwarz; and (3) the

¹ Stettin. ent. Zeitg., XIX, 1858.

Aphididæ, by Theo. Pergande. In studying the remaining unworked material I have here followed my usual plan, and shall give a complete list of all the species in the suborder Homoptera now known to occur in Alaska, arranged in systematic order.

In all, twenty-four species are known in this suborder, arranged under five families and thirteen genera. Of the species, four have a wide distribution in Europe and North America, namely, *Euacanthus acuminatus* (Fabr.), *Deltocephalus abdominalis* (Fabr.), *Cicadula sexnotata* (Fallen), and *C. fasciifrons* (Stål), and will ultimately be found to occur in northern Asia. *Cicadula læta* (Uhler) occurs in Colorado and Labrador.

SYSTEMATIC ACCOUNT.

Order RHYNCHOTA.

Suborder Homoptera.

Superfamily *FULGOROIDEA* Ashmead.¹

Family DELPHACIDÆ.

Genus *Delphax* Fabricius.

DELPHAX STEJNEGERI Ashmead.

Delphax stejnegeri ASHM., Fur Seals and Fur Seal Isl., iv, 340, 1899.

Type.—Cat. No. 4046, U. S. Nat. Mus., from Pribilof Islands, Bering Sea. Additional specimens from Metlakatla, June 4; Popof Island, Shumagin Islands, July 8; Farragut Bay, June 5.

This species was originally described from a single female specimen taken by Dr. L. Stejneger on Bering Island. Several specimens were taken by the Harriman Expedition, among which are two brachypterous males that differ from the female as follows:

Length 2.4 mm. The face, except the frontal and the clypeal carinæ, the scutellum, except the carinæ and the extreme lateral and posterior margins, the depressions on the sides of the pronotum, the mesopleura, except laterally and the sutures, the mesonotum, most of the coxæ and most of the abdomen, except the first and second sutures and sometimes the extreme lateral margins of dorsal segments, the extreme upper edges of the pygofer and the circular disk, surrounding the cerci, which are pale yellowish, are black; otherwise, except in the usual sexual difference, it agrees with the female.

¹ The Superfamily Cicadoidea is not yet reported from Alaska, but undoubtedly has representatives in the interior.

DELPHAX HEMIPTERUS Germar.

Delphax hemiptera GERMAR, Svensk. vet. Akad. handl., 24, 1844.—GERMAR, Mag. d. Ent., IV, 50, 1822.—STÅL, Öfvers. kongl. vet. Akad. förh., VII, 194, 1851.

Sitka.

Superfamily *JASSOIDEA* Van Duzee.

Family BYTHOSCOPIDÆ.

Genus *Idiocerus* Lewis.

IDIOCERUS STRIOLA Fieber.

Idiocerus striola FIEBER, Verh. zöhl.-bot. Gesell. Wien, XVIII, 453, 1868.—VAN DUZEE, Trans. Am. Ent. Soc., XXI, 262, 1894.

Sitka.

Family CERCOPIDÆ.

Subfamily APHROPHORINÆ.

Genus *Aphrophora* Germar.

APHROPHORA CORTICEA (Germar).

Cercopis corticea GERMAR, Mag. d. Ent., IV, 50, 1821.
Aphrophora corticea BOHEMAN, kongl. vet. Akad. handl., 24, 1847.—STÅL, Stettin. ent. Zeitg., XIX, 197, 1854; Die Cicad., 64, 1868.—J. SAHLBERG, Nat. Fenn., XII, 80, 1871.—MELICHAR, Cicad. v. Mittel. Eur., 119, 1896.

Sitka.

Subfamily TETTIGONIINÆ.

Tribe Tettigoniini.

Genus *Euacanthus* Lepeletier et Serville.

EUACANTHUS ACUMINATUS (Fabricius).

Cicada acuminata FABR., Syst. Rhyng., 76, 1803.—FALLEN, Hem. Suec., II, 29, 1826.—HERR.-SCHAEF., Nom. Ent., 67, 1835.
Tettigonia acuminata FALLEN, D. Ins., III, 1805–1806.
Euacanthus acuminatus KIRSCHBAUM, Cicad. Wiesb. u. Frankf., 73, 1868.—FLOR., Rhync. Liol., II, 152, 1861.—J. SAHLBERG, Nat. Fenn., XII, 108, 1868.—EDWARDS, Syn. Brit. Hemop., II, 1886.—MELICHAR, Cicad. Hem.-Homop. Mitkl. Europ., 179., 1896.
Amblycephalus germari MARSHALL, Ent. Mo. Mag., II, 85, 1865.

Fox Point, Southeast Alaska, July; Metlakatla, July 4.

Six specimens. It has also been taken at Fort Wrangell by Professor W. H. Wickham.

Family JASSIDÆ.

Tribe Deltocephalini.

Genus *Deltocephalus* Burmeister.

DELTOCEPHALUS ABDOMINALIS (Fabricius).

Cercopis bicolor FABRICIUS, Ent. Syst., IV, 40, 1794.

Cercopis abdominalis FABRICIUS, Syst. Rhyn., 98, 1803.

Cicada abdominalis FALLEN, Hem. Suec., II, 37, 1829.—ZETTERSTEDT, Ins. Lappon., 290, 1840.

Jassus (*Deltocephalus*) *abdominalis* FLOR., Rhync. Liol., II, 249, 1860.—

GERMAR, Faun. Ins. Eur., fasc. 17, tab. 19.—KIRSCHBAUM, Die Cicad. v. Wiesbaden u. Frankfurt, 129, 1868.

Deltocephalus abdominalis FIEBER, Verh. zöol.-bot. Gesell. Wien, XIX, 215, 1869.—J. SAHLBERG, Nat. Fenn., XII, 328.—EDWARDS, Syn. Brit. Homop., 44, 148.—MELICHAR, Cicad. v. Mittel. Eur., 140, 1896.

Popof Island, Shumagin Islands, July 7.

DELTOCEPHALUS HARRIMANI sp. nov.

Male.—Length to tip of elytra 3.2 mm. Pale or light mushroom brown, the mesonotum with at least three faint pale longitudinal lines, the vertex with a pale median line and a hook-shaped line on each side, the face with 7 or 8 transverse whitish lines interrupted medially; the thorax beneath, except the sutures and margins of the sclerites, and the abdomen, except the apex of the penultimate and ultimate ventral segments and the apical margins of the dorsal segments, which are pale, are smoky or blackish; the legs are pale, the front femora with a brown annulus at base, the two last joints of the hind tarsi fuscous. Elytra hyaline, the veins pale, the clavus with two oblong brown spots, and an irregular series of brown dashes or spots, extending from the middle discoidal cell forward to and enclosing the middle apical cell.

Type.—Cat. No. 6868, U. S. Nat. Mus., from Seldovia, Kenai Peninsula, July 7. Three specimens.

DELTOCEPHALUS EVANSI sp. nov.

Male.—Length to tip of elytra, which extend beyond tip of abdomen, 5 mm. Form of *D. abdominalis* (Fabr.), but slightly smaller and pale greenish, the upper surface of the head, thorax, and the elytra immaculate, except two fuscous dashes at the middle of the angular head and a slight curved line on each side extending from the dashes toward the eyes; frons with 6 or 7 transverse fuscous lines, these becoming shorter and shorter, the seventh being a mere dot; sutures of the face and lora fuscous; thorax at sides and beneath and the abdomen blackish; some of the abdominal segments at apex are narrowly margined with yellowish white; while the legs are maculate with fuscous spots.

Female.—Length to tip of abdomen 4.5 mm., the elytra somewhat abbreviated and not extending to the tip of the abdomen. Differs in color from the male in having the apex of the abdomen, the venter, and legs pale yellowish, the hind tarsi fuscous. Kusilof, July, 1899 (W. H. Evans).

Type.—Cat. No. 6869, U. S. Nat. Mus., from Kusilof, July, 1898 (W. H. Evans). Additional specimens from Metlakatla, July 4.

Tribe Cicadulini.

Genus *Cicadula* Zetterstedt.

CICADULA SEXNOTATA (Fallen).

Cicada sexnotata FALLEN, Acta Holm., XXII, 34, 1806.—Kongl. vet. Akad. handl., 33, 1806.—FALLEN, Hem. Suec., II, 47, 1826.

Eupteryx sexnotata CURTIS, Brit. Ent., XIV, 14, pl. 640, 10.

Tettigonia 6-notata GERM., Faun. Ins. Eur., fasc. 14, tab. 13.

Jassus 6-notatus BURMEISTER, Gen. Ins., I, no. 17, 1840.—WALKER, List Homop. Brit. Mus., III, 878, 1851.—FLOR., Rhync. Liol., II, 341, 1861.

—MARSHALL, Ent. Mo. Mag., III, 125, 1867.—THOMSON, Opus. Ent., I, 77.

Acrostes 6-notata FIEBER, Verh. zöhl.-bot. Gesell. Wien, XVI, 54, 1866.

Limnotettix sexnotata J. SAHLBERG, Nat. Fenn., XII, 247, 1879.—STÅL, Stettin. ent. Zeitg., XIX, 194, 1858.—EDWARDS, Trans. Ent. Soc. London, 76, 1888.

Cicada alpina ZETTERSTEDT, Ins. Lappon., 297, 1840.

Cicadula sexnotata ZETTERSTEDT, Ins. Lappon., 297, 1840.—SCOTT, Ent. Mo. Mag., XI, 230, 1870.—FIEBER, Revue d'Ent., IV, 47, 1885.—WOODWORTH, Psyche, V, 75, 1888–90.—PROVANCHER, Pet. Faun. Ent. Can., III, 287, 1890.—VAN DUZEE, Psyche, VI, 305, 1891–92.—HARRINGTON, Ottawa Nat., VI, 32, 1892.—SOUTHWICK, Science, XIX, 288, 1892.—OSBORN, Proc. Iowa Acad. Sci., I, 12, 1892.—SLOSSON, Ent. News, V, 5, 1894.—VAN DUZEE, Trans. Am. Ent. Soc., XXI, 307, 1894.—MELICHAR, Cicad. v. Mittel-Eur., p. 309, 1896.

Popof Island, Shumagin Ids., July 17; Seldovia, July 21; Karluk, Kadiak Island.

CICADULA FASCIIFRONS (Stål).

Thamnotettix fasciifrons STÅL, Stettin. ent. Zeitg., XIX, 192, 1858.

Cicadula fasciifrons FIEBER, Revue d'Ent., IV, 48, 57, 1885.—VAN DUZEE, Trans. Am. Ent. Soc., XXI, 308, 1894.

Sitka; Popof Island, Shumagin Ids., July 7; Seldovia, July 21; Karluk, Kadiak Island. Sixteen specimens.

CICADULA LÆTA (Uhler).

Jassus lætus UHLER, Bull. U. S. Geol. Surv., II, 360, 1876; id., III, 473, 1877.

Thamnotettix lætus VAN DUZEE, Psyche, VI, 306, 1891–92; Can. Ent., XXIV, 268, 1892; Trans. Am. Ent. Soc., XXI, 303, 1894.

Popof Island, Shumagin Islands, July 7.

CICADULA LINEATIFRONS (Stål).

Thamnotettix lineatifrons STÅL, Stettin. ent. Zeitg., XIX, 195, 1858. — FIEBER, Revue d'Ent., IV, 85, 1885. — VAN DUZEE, Trans. Ent. Soc., XXI, 303, 1894.

Sitka; additional specimens from Seldovia, July.

CICADULA UNGÆ sp. nov.

Female.—Length to tip of elytra 5.1 mm. Stature and general appearance of *C. læta* (Uhler), and evidently allied. General color yellowish, the vertex and the face black; the crown has a yellowish median line which extends forward and connects with a transverse yellowish band on the upper margin of the face, and on each side of this median line is a circular yellowish line enclosing a rounded black spot, which, however, is not entirely separated from the black along the eyes; cheeks yellowish, with a spot beneath the eyes and an oblique line across the lora black; thorax at sides and beneath black, the mesonotum along the anterior and posterior margins blackish, the scutellum black except the extreme margins, the prosternum marked with yellow, the mesopleura with a yellow oblique line which is connected with a yellow line along the hind margin; legs blackish, the joints of the trochanters apically, the front and middle femora at apex and beneath, interrupted by a black spot or band, and the hind femora, except at sides basally, which are black, the black extending into a narrow line, apically, are yellowish; the hind tibiæ are black beneath, with a double row of black dots behind, the joints of tarsi are black apically, with a black line beneath and above. The elytra are yellowish along the costa, the veins being margined with fuscous. Abdomen black, the dorsal segments at apex and along the sides are margined narrowly with yellow, while the terminal ventral segment, except a black spot laterally near the base and along the basal margin, is almost wholly yellow.

Type.—Cat. No. 6870, U. S. Nat. Mus., from Unga Island, Shumagin Islands, July 2. One specimen.

Subfamily TYPHLOCTBINÆ.

Genus Dicraneura Hardy.

DICRANEURA CARNEOLA (Stål).

Typhlocyba carneola STÅL, Stettin. ent. Zeitg., XIX, 196, 1858.
Dicranoneura carneola WOODWORTH, Psyche, V, 213, 1888-90.
Dicraneura carneola VAN DUZEE, Trans. Am. Ent. Soc., XXI, 311, 1894.

Sitka.

Genus *Chloroneura* Walsh.

CHLORONEURA PURA (Stål).

Typhlocyba pura STÅL, Stettin. ent. Zeitg., x, 175, 1858.*Empoasca pura* WOODWORTH, Psyche, v, 213, 1888-90.

Sitka.

Genus *Empoasca* Walsh.

EMPOASCA COMMISSURALIS (Stål).

Typhlocyba commissuralis STÅL, Stettin. ent. Zeitg., xix, 196, 1858.*Empoasca commissuralis* WOODWORTH, Psyche, v, 214, 1888-90.—VAN DUZEE, Trans. Am. Ent. Soc., xxi, 310, 1894.

Sitka.

Superfamily *PSYLLOIDEA* Ashmead.Family *PSYLLIDÆ*.Genus *Aphalara* Förster.

APHALARA SCHWARZI sp. nov.

Aphalara sp. SCHWARZ, Proc. Wash. Acad. Sci., II, 539, 1900.

Female.—Length to tip of abdomen 2.3 mm., to tip of wings 4.2 mm. General ground color greenish-white, the crown of the head, except narrowly at the margins, the middle of the face, the thorax beneath, except narrowly along the sutures of the sclerites, the coxæ, the femora, except apically and basally, the ventral segments, except apical margins, a dot on each side of the collar, the mesonotum, except a median streak posteriorly from the transverse grooved line and extending to the scutellum, the depressions at base of metathorax just back of the scutellum, and the dorsum of the abdomen except at the sutures of the segments, dark fuscous or brown; antennæ whitish or pale, with the terminal joint black.

Wings hyaline, the front wings with a rather broad transverse fuscous band at the basal third which is connected with a fuscous band at the base of the radial cell; there is another fuscous band extending obliquely across the wings from the tip of the radial cell, and two triangular fuscous spots at the apical margin, one enclosing the apex of the cubital vein, the other the lower branch or fork of the cubitus.

FIG. 6. Genitalia of *Aphalara schwarzi*.

Male.—Length to tip of abdomen 1.8 mm., to tip of wings 3.1 mm. Agrees well with the female, except that the head, thorax, and abdomen are darker, almost black, the apices of the abdominal segments being very narrowly whitish, the mesopleura having a whitish streak at the middle, the basal margin of the mesonotum being narrowly whitish

and connected with two median dots just in front of the scutellum, while there are two whitish curved lines on the scutellum.

Genitalia as in fig. 6.

Type.—Cat. No. 6271, U. S. Nat. Mus., from Fox Point, South-eastern Alaska. Additional specimens from Popof Island, July 7; Belkofsky, July 29.

APHALARA KINCAIDI sp. nov.

Male.—Length to tip of abdomen from 1.6 to 1.8 mm., to tip of wings 2.5 to 2.6 mm. General color pale greenish-yellow; there is a large median spot on each lobe of the head above, two dots or lines on the sides of the collar with a puncture beyond near the lateral angles, two triangular spots on the anterior lobe of the mesonotum just back



FIG. 7. Genitalia of *Aphalara kincaidi*.

of the collar, four bands on the mesoscutum and the depressions of the scutellum, dark fuscous or black. The antennæ, except the basal and apical joints which are black, are whitish. Wings hyaline, with some fuscous along the margin of the radial cell, the cubitus and its forks, the fork of the postcubitus apically, the lower fork of the cubitus and the upper fork of the postcubitus; the latter is sometimes connected with a fuscous streak, rarely, however, very distinct.

Genitalia as in fig. 7.

Type.—Cat. No. 6272, U. S. Nat. Mus., from Metlakatla, June 4. Additional specimens from Popof Island, July 9; Fox Point, July.

APHALARA ALASKENSIS sp. nov.

Female.—Length to tip of abdomen 2.3 mm., to tip of wings 3.6 mm. Uniformly pale greenish, the tips of the antennæ and the claws black, the eyes brown. Wings hyaline, with a fuscous streak along the radial vein, along the upper and lower forks of the cubitus, and at the apex of the upper fork of the postcubitus, the latter being connected by a fuscous streak with the base of the cubital fork.

Male.—Colored as in female, and hardly distinguished from it except for the sexual abdominal differences, and by the less distinct fuscous streak along the nervures, the upper fork of the postcubitus not being connected by a fuscous streak with the base of the cubital fork.

Genitalia as in fig. 8.

Type.—Cat. No. 6273, U. S. Nat. Mus., from Fox Point, South-eastern Alaska, July.



FIG. 8. Genitalia of *Aphalara alaskensis*.

Genus *Psylla* Geoffroy.

PSYLLA ALASKENSIS sp. nov.

Female.—Length to tip of abdomen 2.8 mm., to tip of wings about 5 mm. Greenish-yellow; last four or five joints of antennæ, especially toward apex, more or less fuscous; eyes green; large spot on each side of collar and the depressions and sutures of scutellum and metathorax more or less fuscous; median line on anterior lobe of mesonotum and four lines on posterior lobe whitish. Wings pale greenish-hyaline, immaculate, except a faint dusky shade toward the apices.

Male.—Length to tip of abdomen 1.8 mm., to tip of wings less than 3 mm. Colored as in female, except the antennal joints 3 to 6 are tipped with black, while the wings are more distinctly dusky at apex.

Genitalia as in fig. 9.

Type.—Cat. No. 6274, U. S. Nat. Mus., from Popof Island, Shumagin Ids., July 16. Additional specimens from Fox Point, July 19; Seldovia, July 21.



FIG. 9. Genitalia of *Psylla alaskensis*.

Superfamily *APHIDOIDEA* Ashmead.Family *APHIDIDÆ*.Genus *Nectarophora* Koch.

NECTAROPHORA CAUDATA Pergande.

Nectarophora caudata PERGANDE, Proc. Wash. Acad. Sci., II, 513, ♀, 1900.

Type.—Cat. No. 5274, U. S. Nat. Mus., from Juneau.

NECTAROPHORA EPILOBII Pergande.

Nectarophora epilobii PERGANDE, Proc. Wash. Acad. Sci., II, 515, ♀, 1900.

Type.—Cat. No. 5276, U. S. Nat. Mus., from Popof Island, Shumagin Ids.

NECTAROPHORA INSULARIS Pergande.

Nectarophora insularis PERGANDE, Proc. Wash. Acad. Sci., II, 515, ♀, 1900.
St. Paul Island, Bering Sea.

Genus *Cladobius* Koch.

CLADOBIUS POPULENS (Kaltenbach).

Aphis populens KALTENBACH, Monogr. d. Pflanzenl., I, 116, 1843.

Cladobius populens PERGANDE, Proc. Wash. Acad. Sci., II, 516, 1900.

Superfamily *COCCOIDEA* Ashmead.

No Coccid is yet reported from Alaska, although a species, probably an *Aspidiotus*, is found on willows.

HETEROPTERA OF THE EX-
PEDITION

The following paper on the Heteroptera of the Expedition, by O. Heidemann, Division of Entomology, U. S. Department of Agriculture, was originally published in the Proceedings of the Washington Academy of Sciences, vol. 11, pp. 503-506, Dec. 20, 1900. It is here reprinted from the same electrotpe plates, so that it may be quoted exactly as if it were the original. The original pagination has been preserved and transferred to the inner or hinge side of the page, where it is enclosed in brackets, thus [504]; while the consecutive pagination of the present volume has been added in the usual place. The present headpiece and title have been substituted for the running heading of the Academy's Proceedings and the original title, which was: *Papers from the Harriman Alaska Expedition. XIII. Entomological Results (7): Heteroptera*. No other alterations have been made.

The author desires to record the following corrections :

Page 141 [503] :

Tenth line from bottom, for 'Megalocræa' read *Megaloceræa*.

Ninth line from bottom, for 'Megalocræa (Trigonotylus)' read *Minis*.

Page 142 [504] :

Second line from top, for 'Leptopterna ferrugata' read *Minis ferrugatus* ; insert after 'Succ.,' *I*.

Ninth line from top, for 'p. 1870, 1858,' read *xix*, *p.* 187, 1858, *Q*.

Twentieth line from bottom, for 'Capsus ater Linné, Fauna Suec., p. 253, 1761,' substitute the following: *Cimex ater* Linné, *Syst. Nat.*, ed. 2, *p.* 447, 1758.

Fifteenth line from bottom, for 'xix' read *xxi*; for '1876-79' read 1879.

Fifth line from bottom, for 'Lygus' read *Cimex*.

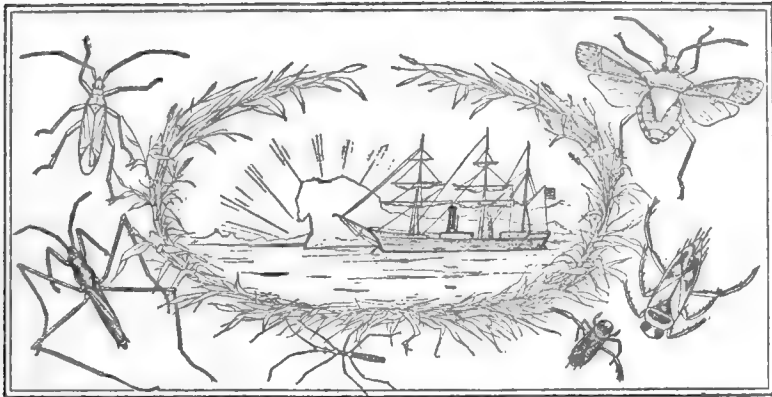
Page 143 [505] :

Second line from top, for 'Lygus (Orthops)' read *Orthops*.

Eighth line from top, for 'Lygus' read *Cimex*.

Fifteenth line from top, for 'Pæcilocytus' read *Lygæus*.

EDITOR.



HETEROPTERA OF THE EXPEDITION

BY O. HEIDEMANN

THE collection of Hemiptera-Heteroptera of the Harriman Alaska Expedition, made by Prof. T. Kincaid, although small, contains ten species of the family Capsidæ, two of Lygæidæ, one each of Aradidæ and Nabidæ, one of Gerridæ, and three of Corisidæ. These species are all well known except one of the family Aradidæ. It is interesting to note the wide geographical distribution of some of the European and East Siberian Hemiptera, namely, from Siberia over Bering Island to Alaska and into the American Continent.

Family CAPSIDÆ.

Megalocræa (Trigonotylus) ruficornis Fallen.

Megalocræa (Trigonotylus) ruficornis FALLEN, Hem. Suec., 1, 133, no. 8, 1829.—UHLER, Hayden, Mont. Surv., p. 409, 1872.—REUTER, Rev. Caps., p. 23, 1875.

Seven specimens, five males and two females, from Cook Inlet, Saldovia (July 21). Inhabits all Europe, East Siberia, United States, and Canada.

Miris sp.?

A number of immature forms from Cook Inlet, but as no adult is among them the species can not be ascertained.

Leptopterna ferrugata Fallen.

Leptopterna ferrugata FALLEN, Hem. Suec., 129, 2, 1829.—REUTER, Rev. Caps., p. 14, 1875.

Three females (brachypterous) and one male (macropterous), the latter not quite mature, from Kadiak (July 20). A European species, also known from Siberia. It is most closely allied to the American species *Leptopterna amana* Uhler.

Mecomma (Leptomerocoris) gilvipes Stål.

Mecomma (Leptomerocoris) gilvipes STÅL, Stett. Ent. Zeit., p. 1870, 1858.—REUTER, Ofv. Finska Vet. Soc. Förh., XXI, p. 57, 1881. Gymn. Eur., III, pp. 355, 386, 1883.

Numerous specimens, males and females, from Popof Island (July 9), Karluk, Kadiak (July 20), Saldovia (July 21), Belkofsky, July 22. This species is originally described from Sitka, Alaska, and is also found in East Siberia. The female is always brachypterous. The species is distinguished from the other European form, *Mecomma ambulans* Fallen, by the more slender second joint of antennæ and by the whitish colored hemelytra of the female. Professor Ph. R. Uhler records the latter species also from British America.

Capsus ater Linné.

Capsus ater LINNÉ, Fauna Suec., p. 253, 1761.—Uhler's List, p. 18, 1886.

A single specimen, a male, from Kukak Bay, Alaska Peninsula (July 1). Found in all Europe, Siberia, and boreal America.

Irbisia (Leptomerocoris) sericans Stål.

Irbisia (Leptomerocoris) sericans STÅL, Stett. Ent. Zeit., XIX, p. 188, 1858.—REUTER, Ofv. Finska Vet. Soc. Förh., XIX, p. 57, 1876-79.

Series of macropterous and brachypterous forms, from Sitka, Virgin Bay, Kukak Bay, Karluk, Kadiak, Fox Point, Popof Island (June, July), Belkofsky, July 2. The insect is dimorphous. Males and females of both forms. Originally described from Sitka, Alaska. Found on Bering Island, also on Copper Island and Pribilof Islands (Barrett-Hamilton). The same species has been collected by Mr. E. A. Schwarz in Oregon, near Hood River. Other species of this genus extend down the Pacific coast as far as Lower California.

Lygus pabulinus Linné.

Lygus pabulinus LINNÉ, Fauna Suec., p. 253, 1761.—Uhler's List, p. 18, 1886.

Five specimens, male and female, and some immature ones, from Juneau. A European insect; occurs also in East Siberia and boreal America.

Lygus (Orthops) scutellatus Uhler.

Lygus (Orthops) scutellatus UHLER, Bull. U. S. Geol. Surv., II, p. 420, 1877.
—DISTANT, Biol. Centr. Amer., Hem.-Heter., p. 274, 1884.

Two specimens, females, from Fox Point (July). Described from Colorado; found throughout the United States and Canada; also a variety in Mexico.

Lygus pratensis Linné.

Lygus pratensis LINNÉ, Syst. Nat. Ed., x, 59, 448, 1758.—FALLEN, Mon. Cim., p. 83, 1867.—Uhler's List, p. 18, 1886.

Two specimens, male and female, from Saldovia and Kukak Bay (July). The latter belongs to the variety *L. campestris* Fallen. A most variable insect, found in all Europe, Siberia, United States, and Canada.

Pæcilocythus unifasciatus Fabricius.

Pæcilocythus unifasciatus FABRICIUS, Ent. Syst., IV, 158, 178, 1794.—UHLER, List of the Hemiptera of Colorado, p. 38, 1895.

Three specimens, two females and one male, from Kukak Bay (July 1), Kadiak (July 20). Inhabits all Europe, Siberia, and boreal America.

Family LYGÆIDÆ.**Nysius grønlandicus Zetterstedt.**

Nysius grønlandicus ZETTERSTEDT, Ins. Lapp., pp. 262, 263, 1840.—STÅL, Enum., IV, p. 121, 1874.

Eight specimens, four females and four males, from Saldovia (July 21). This species is described from Greenland and has also been found at Ungava Bay, Hudson Bay Territory, by L. M. Turner (National Museum collection).

Scolopostethus thomsoni Reuter.

Scolopostethus thomsoni REUTER, Ann. Soc. Ent. France (5), IV, p. 562, 1874.—HORVATH, Rev. d'Entom., XII, p. 240, 1893.

A single specimen, male, from Sitka (June 16). It is a European species and the only one recorded as occurring also in boreal America. I have seen specimens from California (Argus Mountains), and from Colorado (National Museum collection). The genus is well represented also on this Continent: there have been found two other American species, *S. diffidens* Horv. and *S. atlanticus* Horv., and some not yet described.

Family ARADIDÆ.**Aradus sp.?**

One specimen, a male, from Saldovia (July 21). There seems to be no record of any *Aradus* found before in Alaska. The specimen

now taken by Professor Kincaid may likely be a new species. It belongs to the *Aradus betulæ* group, and is most closely allied to Say's species, *Aradus similis*, but differs in having the margins of abdomen more parallel, the prolongation of head more elongate, and the scutellum quite differently shaped. The sides are sinuated and the basal inner part of scutellum more transversely elevated. As there is but one specimen, a satisfactory description of a new species can not be given.

Family NABIDÆ.

Nabis flavo-marginatus Scholz var. **sibericus** Reuter.

Nabis flavo-marginatus var. *sibiricus* REUTER, Ofv. Finska Vet. Soc. Förh., XIX, p. 60, 1877.

Three specimens, females, from Cook Inlet and Kadiak (July). The species is known from Europe, Siberia, and Greenland. *Nabis flavo-marginatus* Scholz is also found in Canada (St. John, New Brunswick).

Family GERRIDÆ.

Gerris rufoscutellatus Latreille.

Gerris rufoscutellatus LATREILLE, Gen. Crust. et Ins., III, p. 134, 1807.—Uhler's List, p. 26, 1886.

Two specimens from Metlakatla (June 6). The insect is found in Europe, East Siberia, and boreal America.

Family CORISIDÆ.

Corisa germarii Fieber.

Corisa germarii FIEBER, Species Generis Corisa, II, p. 38, 1858.—Uhler's List, p. 29, 1886.

Nine specimens, four males and five females, from Popof Island. Inhabits Europe, North America, Alaska.

Corisa convexa Fieber.

Corisa convexa FIEBER, Species Generis Corisa, II, p. 37, 1858.—Uhler's List, p. 29, 1886.

Three females, from Popof Island and Berg Bay. Found also in North America and Labrador, near the coast line.

Corisa præusta Fieber.

Corisa præusta FIEBER, Species Generis Corisa, II, p. 28, 1858.—Uhler's List, p. 29, 1886.

Five specimens, one male, the others females, from Muir Glacier (pond on the west side, June 12), Popof Island (June 20), Berg Bay (June 10), Kadiak (July), Sitka. Previously found at Sitka.

ODONATA OF THE EXPEDITION

The following paper on the Odonata of the Expedition, by Rolla P. Currie, Aid, Division of Insects, U. S. National Museum, was originally published in the Proceedings of the Washington Academy of Sciences, vol. III, pp. 217-223, July 13, 1901. It is here reprinted from the same electrotpe plates, so that it may be quoted exactly as if it were the original. The original pagination has been preserved and transferred to the inner or hinge side of the page, where it is enclosed in brackets, thus [218]; while the consecutive pagination of the present volume has been added in the usual place. The present headpiece and title have been substituted for the running heading of the Academy's Proceedings and the original title, which was: *Papers from the Harriman Alaska Expedition. xxii. Entomological Results (14): The Odonata.* No other alterations have been made.

The author desires to record the following corrections:

Page 147 [217]:

Eleventh line from bottom, for 'three' read *four*.

Eighth line from bottom, omit 'and.'

Seventh line from bottom, insert after '(Say)': *and Anax junius (Drury)*, and change 'eleven' to *twelve*.

EDITOR.



ODONATA OF THE EXPEDITION

BY ROLLA P. CURRIE

THE Odonata collected by Professor Trevor Kincaid during the Harriman Expedition comprise eight species, represented by eighty-nine specimens. None of these appear to be new; yet the collection is interesting in that it serves to extend the known range of certain forms and to add to our knowledge of the Odonata fauna of Alaska.

No paper on the dragonflies of this territory has been hitherto published; and only three species, additional to the eight collected by the Harriman Expedition, have been previously reported from Alaska. These are *Enallagma annexum* (Hagen), *Æschna sitchensis* (Hagen) and *Æschna clepsydra* (Say), thus making eleven species.

Family *AGRIONIDÆ*.

Subfamily *AGRIONINÆ*.

LESTES species (?).

One female belonging to some species of this genus was taken at Fox Point, July 26-28. The species of *Lestes* are separated, mainly, by the characters of the male abdominal appendages, and females taken

singly cannot always be determined with certainty. The following description of the specimen is given for future reference :

Length 34 mm.; abdomen 26; hind wing 20.7; pterostigma 1.7. Blackish-brown. The following parts are pale yellowish, viz : under parts of head, lips, genæ (except a few spots), rhinarium, tips of two basal joints of antennæ, mid-dorsal thoracic carina, humeral stripe (which is wider below), sides of thorax inferiorly (except 2d lateral suture above and some spots near coxæ), and venter of thorax (except middle line which is wider behind). Abdomen yellowish, marked above with dark metallic green as follows : on segment 1, a narrow longitudinal median line, widening behind, and divided into two large divaricate spots; on 2, a mid-dorsal band, divided by a median line which is widened in front, the band widened and orbicular posteriorly (enclosing a pale spot on either side) and connected with the dark apical ring by a short stalk; 3-5 similar, but the dividing line uniformly narrow, the band forming a point anteriorly and barely reaching the base; 6 without posterior pale spots, the bands otherwise as in 3-5; on 7 and 8 the band is wider, not separated, not stalked behind; on 9 and 10 they narrow posteriorly; the bands on 6-10 are blackish-brown, hardly metallic. Sides of abdomen with indistinct dark markings, these principally apical. Venter dark. Tenth segment with its apical margin triangularly notched above, scarcely elevated. Anal appendages two-thirds the length of 10, conical, pale, black on apical half. Genital valves pale, their edges dark apically and minutely denticulate; valvular processes dark, about as long as appendages. Legs pale, the femora without, tibiæ within, and the tarsi, black. Pterostigma brown.

ENALLAGMA CALVERTI Morse.

Enallagma calverti MORSE, Psyche, VII, No. 227, p. 208, March, 1895. (Male described.)—WILLIAMSOM, Ent. News, XI, No. 5, p. 455, text fig. 6, Pl. IX, figs. 5, 9 and 10, May, 1900. (Female described and male appendages figured.)

Kukak Bay, June 29-July 5; Cook Inlet, July 21; Kadiak, July 20; Juneau, July 25: thirty-three males and nineteen females.

These specimens average larger than those I have seen from the United States: Length, ♂ 30.7 mm.-35 mm., ♀ 31.5-35.6; abdomen ♂ 24-27.3, ♀ 24.8-27.3; hind wing ♂ 18.7-21.8, ♀ 20-22.2. In the markings of head, thorax, and abdomen they agree fairly well with *E. cyathigerum* (Charpentier) as described by Selys¹ and exhibit similar variations in the shape and extent of the dorsal abdominal markings, as follows :

¹ Bull. Acad. Belg. (2), XLI, p. 505, 1876.

Males: On segment 1, basal spot usually quadrate, narrowed and more or less rounded on sides behind, its hind margin sometimes excised but usually straight or nearly so and generally with a small median triangular projection; on segment 2, transverse posterior spot: *in front*, convex and more or less rounded, sometimes pointed medially; *behind*, convex, or straight, or sinuated and pointed; sometimes united with apical margin by a short stalk which varies greatly in length, width and shape; sometimes connected with an inferior lateral stripe present in some specimens; on segments 3 to 6, spots more or less pointed anteriorly, widened and usually rounded posteriorly, broadly united with apical ring; spot on segment 3 covering posterior $\frac{1}{8}$ to $\frac{1}{2}$; on 4 covering $\frac{1}{8}$ to $\frac{3}{4}$; on 5, $\frac{2}{8}$ to $\frac{4}{8}$; on 6, $\frac{2}{8}$ to $\frac{5}{8}$. The spot on segment 7 covers apical $\frac{5}{8}$ or more. Dorsum of segment 10 entirely black. Other irregularly placed spots are sometimes present.

Females: Spot on segment 1 similar to that of the males; on 2 quite variable in shape and size, the narrowed portion not always reaching the anterior margin, sometimes bifid; posterior widened portion rounded or angulate laterally; connected directly, or by a short wide stalk, with the apical ring. Spots on segments 3 to 7 similar to those on male but longer, covering apical $\frac{3}{4}$ or more on all of them. Spot on segment 8 exceedingly variable in shape, broadly or narrowly pointed anteriorly, widened behind, connected with posterior margin directly or by a stalk, in one specimen *not* reaching posterior margin; widened portion sometimes connected with a lateral spot or stripe. Spots on segments 9 and 10 covering entire dorsum, narrowing behind.

The postocular spots (in both sexes) are large and in most specimens denticulate behind as in *E. annexum* (Hagen), the denticulations sometimes connected with the blue of rear of head. The male appendages agree well with those of *calverti* as described by Morse and figured by Williamson.

These variations seem to be individual rather than geographical, although the males from Juneau all have very long dorsal spots on the abdominal segments.

This species, described from Nevada, has also been reported from Massachusetts, Maine, Wyoming and Washington.

Family ÆSCHNIDÆ.

Subfamily ÆSCHNINÆ.

ÆSCHNA JUNCEA (Linn.).

Libellula juncea LINN., Syst. Nat., 1, p. 544, n. 10, 1758.

Æschna juncea KIRBY, Synonymic Cat., p. 87, 1890.

One male from Kadiak, July 20; one female, Unga Island, July 17, collected by Prof. W. E. Ritter. The National Museum also contains one male and three females from Nushagak River, Alaska, collected by McKay (No. 97).

This species occurs throughout the northern portions of Europe, Asia, and North America.

The pterostigma is brown, paler in the female specimen.

ÆSCHNA CONSTRICTA (Say).

Æshna constricta SAY, Journ. Ac. Phila., VIII, p. 11, 1839.

Æschna constricta KIRBY, Synonymic Cat., p. 88, 1890.—CALVERT, Trans. Am. Ent. Soc., XX, p. 249, 1893.—KELLICOTT, Bull. Ohio State Univ. (4), No. 5, p. 83, March, 1899.—WILLIAMSON, 24th Ann. Rep. Dept. Geol. and Natural Resources, Ind., 1889, p. 305, Pl. IV, fig. 10, Pl. VII, figs. 14 & 15, 1900.

Two males, Kadiak, July 20, and Cook Inlet, July 21; two females, Kadiak, July 20.

This is a common species in the United States and has also been recorded from British Columbia, Kamchatka, and Siberia.

The pterostigma in the males is black; in the females yellowish-brown.

Family LIBELLULIDÆ.

Subfamily CORDULINÆ.

CORDULIA SHURTLEFFI Scudder.

Cordulia shurtleffi SCUDDER, Proc. Bost. Soc. Nat. Hist., x, p. 217, 1866.—SELYS, Bull. Acad. Belg. (2), XXXI, p. 265, 1871.—KIRBY, Synonymic Cat., p. 52, 1890.

One female, Kukak Bay, June 29–July 5; one female, Fox Point, July 26. A female, labeled 'Alaska' and determined as this species, by Dr. P. P. Calvert, is in the collection of the U. S. National Museum; it was received from the U. S. Coast and Geodetic Survey, through Professor T. C. Mendenhall, Superintendent.

This species has also been reported from Nova Scotia, Great Slave Lake (Fort Resolution), New Hampshire, Maine and Pennsylvania.¹

The wings are subfumose in the specimen from Fox Point.

SOMATOCHLORA ALBICINCTA (Burmeister).

Epophthalmia albicincta BURMEISTER, Handb. Ent., II, p. 847, 1839.

Cordulia albicincta HAGEN, Syn. Neur. N. Am., p. 138, 1861.

Cordulia eremita SCUDDER, Proc. Bost. Soc. Nat. Hist., x, p. 215, 1866.—SCUDDER, Proc. Bost. Soc. Nat. Hist., XI, p. 300, 1867.

Epitheca albicincta SELYS, Bull. Acad. Belg. (2), XXXI, p. 303, 1871.

Somatochlora albicincta KIRBY, Synonymic Cat., p. 49, 1890.

¹ Ent. News, IX, p. 184, September, 1898.

Eight males and one female, Kadiak, July 20; one female (L. J. Cole, collector), Kadiak, July 4; one male and two females, Kukak Bay, June 29–July 5.

Length, ♂ 47 mm.–49 mm., ♀ 49–50; abdomen with appendages, ♂ 34–36.8, ♀ 35–36.4; hind wing, ♂ 29.4–31.6, ♀ 31–32.2; pterostigma, ♂ ♀ 2.5–3.5; appendages, ♂ 3, ♀ 3.4. The wings in the males are almost clear hyaline; in the females they vary from a clear hyaline to a distinct subfumose. Triangles on anterior wings free or crossed by one nervule; on posterior wings, free (crossed by one nervule in one male and one female); sometimes crossed on right wing, free on left and vice versa. The luteous lateral thoracic spots are sometimes very small or entirely absent.

This species was described from Labrador by Burmeister, while Scudder's *eremita* was from Hermit Lake, in the White Mountains of New Hampshire. Kirby, in his synonymic catalogue, gives it also as occurring in Alaska.

Subfamily LIBELLULINÆ.

LEPTETRUM QUADRIMACULATUM (Linn.)

Libellula quadrimaculata LINN., Syst. Nat., I, p. 543, 1758.—CALVERT, Trans. Am. Ent. Soc., XX, p. 258, 1893.—KELLCOTT, Bull. Ohio State Univ. (4), No. 5, p. 100, March, 1899.—WILLIAMSON, 24th Ann. Rep. Dept. Geol. and Natural Resources, Ind., 1899, p. 331, 1900.
Leptetrum quadrimaculatum KIRBY, Synonymic Cat., p. 27, 1890.

Two males from Fox Point, July 26–28. This species is found throughout the Northern Hemisphere.

The wings in these two specimens are not clear hyaline, where unmarked, but have a subfumose tinge.

LEUCORHINIA HUDSONICA (Selys).

Libellula hudsonica SELYS, Revue des Odonates ou Libellules d'Europe, Mem. Soc. Roy. Sci. Liège, VI, p. 53, 1850.
Diplax hudsonica HAGEN, Syn. Neur. N. Am., p. 180, 1861.
Leucorhinia hudsonica HAGEN, Proc. Bost. Soc. Nat. Hist., XVIII, p. 78, 1875.—KIRBY, Synonymic Cat., p. 12, 1890.—HAGEN, Trans. Am. Ent. Soc., XVII, p. 233, Pl. X, figs. 13 and 18 a & b, 1890.
Leucorhinia hageni CALVERT, Trans. Am. Ent. Soc., XVII, p. 36, Pl. v, figs. 2–4, 1890.

Kukak Bay, June 29–July 5, two males; Virgin Bay, Prince William Sound, June 25–26, six males and five females.

These specimens agree very well with Calvert's description (*L. hageni*). The color of thoracic dorsum and sides varies in both sexes from yellow to reddish-brown, this variation being, probably, partly

due to difference in age; the majority of the males are reddish-brown and of the females, yellow. There is considerable variation, also, in the extent of the basal spots of anterior and posterior wings; in two of the females the triangular spot of hind wings extends to the inner angle of the triangle; in two other specimens, also females, the first (anterior) spot of front wings *does not* reach the first antecubital; in the males the first (anterior) spot of hind wings reaches not more than half way to the first antecubital, except in two specimens and in neither of these does it quite reach it. The dorsal abdominal spots are pointed behind, not always reaching the hind margin of the segments. Several specimens have a small basal spot on segment 8. The venation is quite irregular; 6-8 antecubitals in front wings of males (regularly 7), 7 in females; 6-9 postcubitals. On posterior wings, 5-6 antecubitals, 6-10 postcubitals. Two or three rows of discoidal areolets on front wings. Discoidal triangles of both wings free or crossed by one vein. Internal triangles free or composed of two or three cells.

This species has been recorded from Lake Winnipeg, Saskatchewan River and Fort Resolution, British America, from Massachusetts, and from Pictou, Nova Scotia.

The following are notes on four species of dragon flies previously reported from Alaska but of which the Harriman Expedition collected no specimens.

ENALLAGMA ANNEXUM (Hagen).

Agrion annexum HAGEN, Syn. Neur. N. Am., p. 87, 1861.

Enallagma cyathigerum race *annexum* SELYS, Bull. Acad. Belg. (2), xli, p. 506, 1876.—WADSWORTH, Ent. News, III, No. 1, p. 8, January, 1892.

Enallagma annexum WILLIAMSON, Ent. News, xi, No. 5, p. 454, text fig. a, Pl. ix, figs. 3 and 7, May, 1900.

Distribution.—Sitka, Alaska (Hagen); Red River and Saskatchewan, British America; (?) Irkutsk, northern Asia; Vancouver Island; Hermit Lake, White Mountains, New Hampshire; Massachusetts (Selys); Manchester, Maine (Miss Wadsworth); Wyoming, California, and Washington (Williamson).

ÆSCHNA SITCHENSIS Hagen.

Æschna sitchensis HAGEN, Syn. Neur. N. Am., p. 119, 1861.—HAGEN, Proc. Bost. Soc. Nat. Hist., xviii, p. 33, 1875.—KIRBY, Synonymic Cat., p. 87, 1890.—HAGEN, Psyche, v, No. 170, p. 353, June, 1890.

Distribution.—Described from Sitka, Alaska, and afterwards reported from Saskatchewan, British America.

ÆSCHNA CLEPSYDRA (Say).

Æshna clepsydra SAY, Journ. Ac. Phila., VIII, p. 12, 1839.

Æschna clepsydra HAGEN, Syn. Neur. N. Am., p. 122, 1861.—KIRBY, Synonymic Cat., p. 89, 1890.—CALVERT, Trans. Am. Ent. Soc., XX, p. 248, 1893.—KELLCOTT, Bull. Ohio State Univ. (4), No. 5, p. 84, March, 1899.—WILLIAMSON, 24th Ann. Rep. Dept. Geol. and Natural Resources, Ind., 1899, p. 305, Pl. VII, figs. 12 and 13, 1900.

Æschna eremita SCUDDER, Proc. Bost. Soc. Nat. Hist., X, p. 213, 1866.

Distribution.—Occurs commonly throughout eastern North America; has also been reported from Dakota and the Saskatchewan in the Great Plains region; and from Irkutsk and the Wilui River, Siberia, and from Finland.

ANAX JUNIUS (Drury).

Libellula junia DRURY, Ill. Nat. Hist., I, pl. 47, fig. 5; App. Vol. II, 1773.

Æshna junia WESTWOOD, Ill., Exot. Ent., by Drury, Westwood's Ed., p. 116, pl. 47, fig. 5, 1837.

Æshna junius SAY, Journ. Acad. Nat. Sci. Phila., VIII, p. 10, 1839.

Æschna junia BURMEISTER, Handb. Ent., II, pt. II, 2d half, p. 841, 1839.—RAMBUR, Hist. Nat. Ins., Neur., p. 196, 1842.

Anax spiniferus RAMBUR, Hist. Nat. Ins., Neur., p. 186, pl. I, fig. 14, 1842.

Anax junia SELYS, Revue des Odonates ou Libellules d'Europe, Mem. Soc. Roy. Sci. Liège, VI, p. 328, 1850.

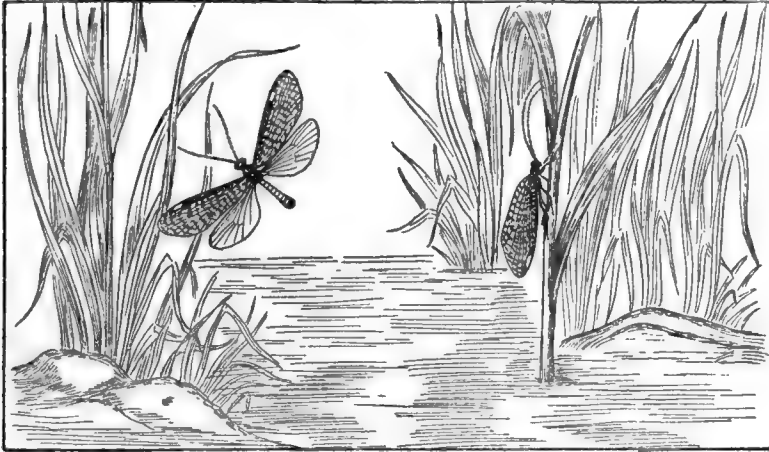
Anax junius HAGEN, Syn. Neur. N. Am., p. 118, 1861.—HAGEN, Verhandl. Zool.-Bot. Gesells. in Wien, XVII, p. 33, 1867.—BRAUER, Reise der Oesterr. Fregatte Novara um die Erde, Zool. Theil II, I Abth., A, Neuropt., p. 62, 1868.—CALVERT, Trans. Am. Ent. Soc., XX, p. 249, 1893.—KELLCOTT, Bull. Ohio State Univ. (4), No. 5, p. 77, March, 1899.—WILLIAMSON, 24th Ann. Rep. Dept. Geol. and Natural Resources, Ind., 1899, p. 306, 1900.—HOLLAND, Ent. News, XI, No. 3, p. 382, March, 1900.

Distribution.—North America, Cuba, Kamchatka, China and Hawaiian Islands. Dr. Holland, in the last citation, records one young male from the mountains between Mission and Fortymile creeks, Alaska, collected July 25, 1899, by Rev. S. Hall Young, and one male from Eagle, Alaska, taken August 3, 1899, by J. Murray Presnall.

NEUROPTEROID INSECTS OF
THE EXPEDITION

The following paper on the Neuropteroid Insects of the Expedition, by Nathan Banks, Division of Entomology, U. S. Department of Agriculture, was originally published in the Proceedings of the Washington Academy of Sciences, vol. 11, pp. 465-476, Dec. 20, 1900. It is here reprinted from the same electrotype plates, so that it may be quoted exactly as if it were the original. The original pagination has been preserved and transferred to the inner or hinge side of the page, where it is enclosed in brackets, thus [466]; while the consecutive pagination of the present volume has been added in the usual place. In the plates the original numbers and running headline, slightly abbreviated, have been preserved [in brackets], while the volume designation and serial plate numbers have been added in the usual place. The original text references to the plates are unchanged. The present headpiece and title have been substituted for the running heading of the Academy's Proceedings and the original title, which was: *Papers from the Harriman Alaska Expedition. x. Entomological Results (4): Neuropteroid Insects.* No other alterations have been made.

EDITOR.



NEUROPTEROID INSECTS OF THE EXPEDITION

BY NATHAN BANKS

THE Neuropteroid insects collected by Professor Kincaid on the Harriman Alaska Expedition represent thirty-four species. They may be tabulated as follows :

Pseudoneuroptera	11	
Perlidae		9
Ephemeridae		2
Neuroptera	1	
Hemerobiidae		1
Trichoptera	22	
Phryganeidae		1
Limnephilidae		16
Leptoceridae		3
Rhyacophilidae		2
Total	34	34

It will thus be seen that the great majority of the species belong to two families, Perlidae and Limnephilidae. As regards the affinities of the fauna we can deal with only the described species, twenty-five in number. These may be tabulated as follows :

Known from Washington State	10
Known from Colorado	4
Known from Europe	2
Known from Northern United States	6
Known from British America	3
Known from Alaska only	8

Leaving out the species restricted to Alaska (some of which will doubtless be found on the West Coast), it will be seen that the fauna is very similar to that of the State of Washington.

The Perlidæ are represented chiefly by species of moderate size; the Trichoptera are represented by many species of large size. As a whole the collection is more brightly colored than those of more temperate latitudes.

PSEUDONEUROPTERA.

Family PERLIDÆ.

Chloroperla imbecilla Say.

Chloroperla imbecilla SAY, LeConte Ed. Compl. Writ., 1, p. 175, 1859.

Several specimens from Popof Island and Kukak Bay (July). Previously known from the Eastern States, Canada, and Washington.

Chloroperla pacifica Banks.

Chloroperla pacifica BANKS, Trans. Amer. Ent. Soc., p. 313, 1895.

Several specimens from Sitka (June) and Juneau (July). Described from Washington.

Chloroperla borealis Banks.

Chloroperla borealis BANKS, Trans. Amer. Ent. Soc., p. 313, 1895.

One specimen from Sitka (June). Described from Washington and Colorado.

Chloroperla decolorata Walker.

Chloroperla decolorata WALKER, Brit. Mus. Cat. Neur., p. 170, 1852.

Several from Popof Island and Kukak Bay (July). Previously known from British America and Canada.

Isopteryx cydippe Newman.

Isopteryx cydippe NEWMAN, Mag. Nat. Hist. (2), III, p. 88, 1839.

Four specimens from Sitka (June). Occurs in the northeastern States and Canada.

Nemoura cinctipes Banks.

Nemoura cinctipes BANKS, Trans. Amer. Ent. Soc., p. 21, 1897.

Four specimens: Sitka and Yakutat (June); Popof Island (July). Described from Washington.

Nemoura sp.

One specimen from Sitka (June). It is a small species, similar to *N. depressa* Banks, but apparently different.

Tæniopteryx sp.

Two specimens from Sitka (June). A rather large species with unmarked wings, except that the costal area is darker.

Leuctra sp.

Two specimens from Sitka (June); apparently like the eastern *L. ferruginea*, but the genitalia are different.

Family EPHEMERIDÆ.**Ephemerella grandis** Eaton.

Ephemerella grandis EATON, Riv. Mon. Eph., p. 128, 1886.

Several examples from Popof Island (July). Described from Colorado.

Bætis sp.

Two adults and a sub-imago: Popof Island (July). It is pale brown, with yellowish legs and white setæ.

NEUROPTERA.**Family HEMEROBIIDÆ.****Hemerobius pacificus** Banks.

Hemerobius pacificus BANKS, Trans. Amer. Ent. Soc., p. 24, 1897.

One specimen from Virgin Bay, Prince William Sound (June). Described from Washington.

TRICHOPTERA.**Family PHRYGANEIDÆ.****Neuronina lapponica** Hagen.

Neuronina lapponica HAGEN, Verh. Zool.-bot. Ges. Wien., p. 852, 1864.

Two specimens, from Kukak Bay (July), of a pretty *Neuronina* which agrees well with this European species in every respect. Not before recorded from the American Continent.

Family LIMNEPHILIDÆ.**Limnephilus gravidus** Hagen.

Limnephilus gravidus HAGEN, Syn. Neur. N. Amer., p. 257, 1861.

Two specimens from Virgin Bay (June). Described from North California; also occurs in Washington.

Limnephilus ornatus Banks.

Limnephilus ornatus BANKS, Trans. Amer. Ent. Soc., p. 27, 1897.

One specimen from Popof Island (July). Known from New Hampshire and Canada.

***Limnephilus sitchensis* Kolenati.** Pls. XXVII, fig. 8; XXVIII, fig. 15.

Limnephilus sitchensis KOLENATI, Gen. e Sp. Trich., II, p. 276, 1859.

Limnophilus pacificus BANKS, Trans. Amer. Ent. Soc., p. 207, 1898.

Many specimens from Kukak Bay, Popof Island, Unga and Unalaska (July). Described from Alaska. My *L. pacificus* is from Washington. At the time of its description I had not access to Kolenati's work.

***Limnephilus harrimani* sp. nov.** Plate XXVII, figs. 1 and 2.

Face yellowish, black hair on sides and yellow in middle; vertex black, silvery near eyes, black hair above, posterior warts yellow, with black hair, ocelli rather small; palpi yellow; antennæ with basal joint brown, beyond yellowish, faintly annulate with brown. Prothorax with rather short yellow hair; rest of thorax black, silvery on middle, with mostly black hair, some yellowish on the sides near base of fore wings; legs yellowish, spines black; abdomen brown. Fore wings yellowish hyaline, largely infuscate with pale brown, sometimes broken up into faint pale spots, bases of the apical cells (except first) hyaline, apex of the thyridial area and base of the first subapical cell also hyaline; several large irregular dark brown spots in thyridial cell, area and subapicals; costal area pale; radius considerably bent at pterostigma, discal cell nearly one-third longer than its pedicel, first and fifth apicals fully their width on discal cell and thyridial area, fourth apical narrow at base. Hind wings hyaline, rather yellowish on tips, yellowish veins and gray fringe; fourth apical cell narrow at base, third broad and with a brown dot. Length 14 mm.; expanse 26 mm.

Two specimens from Kukak Bay (July), and Sitka (June).

Type.—Cat. no. 5259, U. S. National Museum.

***Limnephilus perjurus* Hagen.** Plate XXVIII, fig. 14.

Limnephilus perjurus HAGEN, Syn. Neur. N. Amer., p. 258, 1861.

Two specimens from Popof Island (July). Described from Alaska.

***Limnephilus kincaidi* sp. nov.** Plate XXVII, fig. 5.

Face black, with some yellow hair; vertex black, with black hair above and some yellowish behind; ocelli rather small; palpi pale; antennæ with basal joints black, rest yellowish. Prothorax with yellow hair; rest of thorax black, yellow patagia with yellow hair, yellow hair in middle; legs bright yellowish, usually black on femora except the tips, spines black; abdomen black. Fore wings rather dirty yellow-

ish, sometimes clearer beyond the anastomosis, veins mostly yellowish brown, hair black; radius considerably bent at the pterostigma, discal cell not much longer than its pedicel, first and fifth apical cells about their width on discal cell and thyridial area, fourth apical narrow at base; cubitals fractured at the posterior anastomosis. Hind wings hyaline, rather yellowish at the pterostigma, veins pale, fringe black, fourth apical cell plainly narrower at base than third. Length 13 mm.; expanse 25 mm.

Three specimens from St. George Island, Bering Sea (July).

Type.—Cat. no. 5260, U. S. National Museum.

***Limnephilus nebulosus* Kirby.**

Plate XXVIII, fig. 12.

Limnephilus nebulosus KIRBY, Faun. Bor. Amer., p. 253, 1837.

Four specimens, which apparently belong to this species, from Virgin Bay, Prince William Sound (June), and Saldovia and Kukak Bay (July). Described from British America.

***Limnephilus* sp.**

Two specimens, from Popof Island and Kukak Bay (July), represent a small and probably undescribed species, but the material is not sufficient for study.

***Asynarchus punctatissimus* (Walker).**

Plate XXVII, fig. 6.

Hallesus punctatissimus WALKER, Brit. Mus. Cat. Neur., p. 17, 1852.

Four specimens from Popof Island and Farragut Bay (July). Occurs in Canada and Nova Scotia.

***Asynarchus simplex* sp. nov.**

Plate XXVII, fig. 3.

Head black, with black hair; palpi black; antennæ black, narrowly annulate with pale; ocelli of moderate size. Prothorax with long yellow hair, rest of thorax black, with black hairs in front of wings and yellowish near middle; legs pale yellowish, except the femora which are black, spines black; abdomen dark brown. Fore wings infuscated with pale brown, darker on pterostigma and along hind margin, veins brown, some faint pale spots beyond the anastomosis, hairs and fringe nearly black; radius considerably bent at pterostigma, the discal cell about one-third longer than its pedicel, first and fifth apical cells scarcely their width on discal cell and thyridial area, a brown dot in base of third apical, fourth as wide at base as third, the cubitals fractured at posterior anastomosis. Hind wings hyaline, with yellowish brown veins, pterostigma rather darker, fourth apical cell as wide as third at base. Length 14 mm.; expanse 27 mm.

Two specimens from St. Paul Island, Bering Sea.

Type.—Cat. no. 5261, U. S. National Museum.

***Asynarchus fumosus* sp. nov.**

Plate XXVII, figs. 7, 9, 10.

Face dark in middle, pale on sides, with yellowish hair; vertex black, warts black, with mostly yellowish hair; ocelli small; palpi pale yellowish; antennæ brown, annulate beyond basal joints with yellowish. Prothorax with long yellow hair; thorax black, with mostly yellowish hair; legs yellowish, femora infusate on bases, spines black; abdomen brown. Fore wings brown, shining; veins brown; rather yellowish in base of costal area; many scattered pale dots, most numerous just below the radius; a white mark near apex of thyridium, arculus white; several large whitish hyaline spots as follows: an oblique one in middle of the thyridial area and cell, one each in bases of first, second, fourth and fifth apical cells, a large one in apex of third apical, and a triangular one in apex of first and second subapicals (sometimes one or several of the discal marks are wanting); radius is bent at pterostigma, the discal cell is twice as long as its pedicel, the first apical is rather wide at apex and extends for about its width on discal cell; the fourth is as wide as the third at base, the fifth extends about its width on thyridial area, the cubitals are fractured at posterior anastomosis. Hind wings hyaline, slightly infusate on apex, a white dot in base of third apical cell; the fourth apical is broader at base than third. Length 15 mm.; expanse 29 mm.

Type.—Cat. no. 5262, U. S. National Museum.

Several specimens from Berg Bay (June); also occurs in Washington State. In one specimen the second apical sector fails to reach the margin in each hind wing.

***Asynarchus flavicollis* sp. nov.**

Plate XXVIII, figs. 11 and 13.

Face yellowish, with yellow hair; vertex black, posterior warts yellow, with yellow hair; ocelli small; palpi yellow; antennæ yellowish, faintly annulate with brown. Prothorax yellow, with yellow hairs; rest of thorax black, the patagia and meso-scutellum pale; abdomen yellowish on base, brown at tip; legs clear pale yellowish, spurs reddish, spines black. Fore wings whitish hyaline, largely marked with brown, veins mostly yellowish, brown toward tips, the white spaces of wing with white hair, the brown spaces with brown hair; the brown marks are as follows: space between subcosta and radius, the radial sector and its fork narrowly margined, the third apical cell, the apical half of the fifth apical cell, basal half of the first subapical, all of second and third subapicals, middle of thyridial area, and all but tip of thyridial cell, and along the cubital veins; the first apical is about its width on discal cell, fourth as wide as third at

base, fifth about its width on thyridial area, upper branch of cubitus fractured at posterior anastomosis, radius bent at pterostigma. Hind wings whitish hyaline, more yellowish at tip, veins yellowish; fourth apical cell is as wide as third at base. Length 18 mm.; expanse 34 mm.

Two specimens from Yakutat (June).

Type.—Cat. no. 5263, U. S. National Museum.

***Asynarchus alascensis* sp. nov.**

Plate XXVIII, fig. 16.

Face yellowish, with pale yellow hair; vertex black, with pale yellow hair; ocelli large, looking outwards; posterior warts yellow; palpi pale; antennæ yellowish on base, brownish beyond, narrowly annulate with brown, or brown throughout. Prothorax with tufts of long yellow hair; rest of thorax black, with some yellow hair; legs yellowish, femora more or less infusate on bases, spines black; abdomen brown. Fore wings dirty yellowish-hyaline, sparingly clothed with yellow hair, black on the veins; thyridial cell, except base, and first subapical cell, except tip, whitish, with silvery white hair; veins mostly brown, that closing the thyridial area, a point on thyridium and the arculus white; radius considerably bent at the pterostigma; first apical cell fully its width on discal cell; fifth acute at base, scarcely on thyridial area; cubitals fractured at posterior anastomosis. Hind wings grayish hyaline, rather yellowish beyond anastomosis; discal cell only about twice as long as broad at tip, fourth apical about as broad as third at base. Length 14.5 mm.; expanse 29 mm.

Four specimens: Berg Bay and Virgin Bay (June); Kukak Bay (July).

Type.—Cat. no. 5264, U. S. National Museum.

In one specimen the silvery marks are scarcely visible.

***Halesus* (?) *alascensis* sp. nov.**

Plate XXVIII, figs. 19 and 20.

Face yellow, with black hair on sides and yellowish in middle; vertex brown with yellow hair, ocelli small, posterior warts yellowish, black hair behind the eye; antennæ yellowish; palpi pale, slender. Prothorax yellow, with yellow hair, rest of thorax black, gray on middle, meso- and meta-scutellum yellow, mostly yellow hair; legs rather dirty yellowish, spines black; abdomen brown. Fore wings yellowish in anterior half, brown on posterior half, the division marked by a silvery white line above and a black line below, a black spot at base of the fourth apical cell, pterostigma darker than the nearby regions; veins yellowish; costal region is very broad, apical margin of wing almost concave, membrane finely rugulose and clothed with fine hairs,

radius much bent at pterostigma, discal cell much longer than pedicel, fourth apical narrower than third at base, the cubitals fractured at posterior anastomosis. Hind wings yellowish hyaline, scarcely infusate on tips, a brown dot in base of third apical cell; fourth apical acute at base. Length 18 mm.; expanse 35 mm.

One specimen from Yakutat (June).

Type.—Cat. no. 5265, U. S. National Museum.

***Apatania tripunctata* sp. nov.**

Plate XXVII, fig. 4.

Head black, with white and yellowish hairs; palpi and antennæ black. Thorax black, with short white hair; legs yellowish, femora black except the tips; abdomen black. Wings blackish, darkest beyond the anastomosis; veins black, with black hair; membrane with scattered yellowish hair, fringes black; three hyaline white spots; one on veinlet closing the thyridial area, one on thyridium, one at arculus; hind wings with a white mark at base of the fifth apical cell; in fore wing the first apical is about twice its width on discal cell fifth apical acute at base and not on thyridial area; cubitals fractured at the posterior anastomosis; discal cell one-half longer than its pedicel. Length 11 mm.; expanse 21 mm.

Several specimens from Yakutat (June).

Type.—Cat. no. 5266, U. S. National Museum.

***Apatania* sp.**

One specimen of a small black species from Kukak Bay (July).

Family LEPTOCERIDÆ.

***Molanna* sp.**

Two specimens of an ordinary-looking species from Popof Island and Kadiak (July).

***Mystacides nigra* (Linné).**

Phryganea nigra LINNÉ, Syst. Nat. (12), p. 909, 1768.

Several specimens from Yukatat (June). Widely distributed in Europe and the northern parts of this country.

***Heteroplectron* sp.**

One specimen from Popof Island (July). Apparently different from *H. californicum*.

Family RHYACOPHILIDÆ.

***Glossosoma alascensis* sp. nov.**

Plate XXVIII, figs. 17 and 18.

Black; antennæ yellowish on basal third (except basal joint); legs

brownish yellow, spurs brown, a few pale weak spines on middle and hind tibiae, in female the middle tibiae and first two joints of tarsi broadened and flattened. Wings infusate; veins black; hair mostly black, yellow in regions of pterostigma and arculus; fringes gray; veinlet closing thyridial area, a point on thyridium and the arculus are white; first apical cell is acute at base, but not pedicellate; in hind wings the fifth apical is long pedicellate. Male has a broad elongate plate on middle of base of the fifth ventral segment, and from each side at its base is a curved stout tooth, a spine on sixth and seventh segments. Length 8 mm.; expanse 14.5 mm.

Many specimens from Popof Island (July).

Type.—Cat. no. 5267, U. S. National Museum.

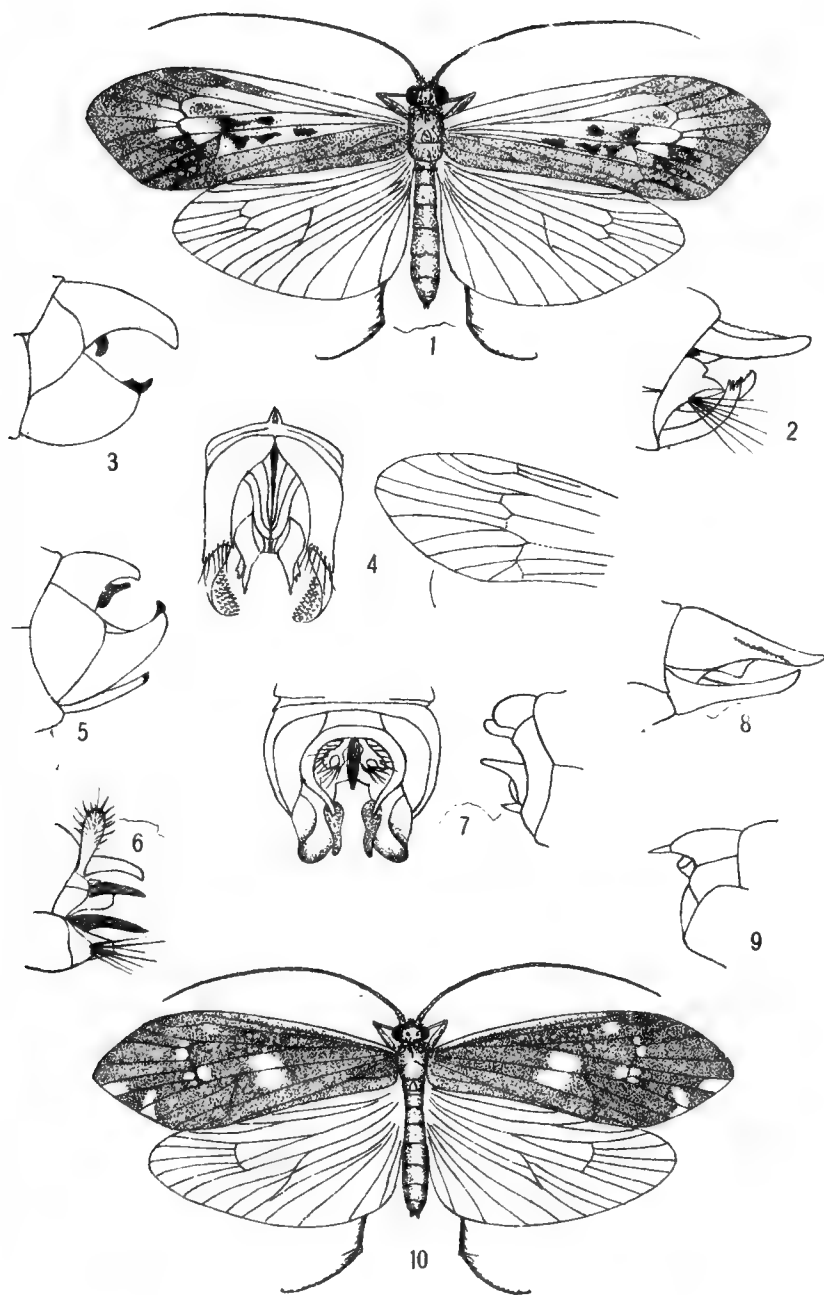
Glossosoma sp.

One specimen of a black species from Popof Island (July).

PLATE XI.

[Proc. Wash. Acad. Sci., Vol. II, Pl. XXVII.]

- FIG. 1. *Limnephilus harrimani*, insect.
2. *Limnephilus harrimani*, ♂ genitalia.
3. *Asynarchus simplex*, ♂ genitalia.
4. *Apatania tripunctata*, wing and ♂ genitalia.
5. *Limnephilus kincaidi*, ♂ genitalia.
6. *Asynarchus punctatissimus*, ♂ genitalia.
7. *Asynarchus fumosus*, ♂ genitalia.
8. *Limnephilus sitchensis*, ♀ genitalia.
9. *Asynarchus fumosus*, ♀ genitalia.
10. *Asynarchus fumosus*, insect.



ALASKA NEUROPTEROIDS

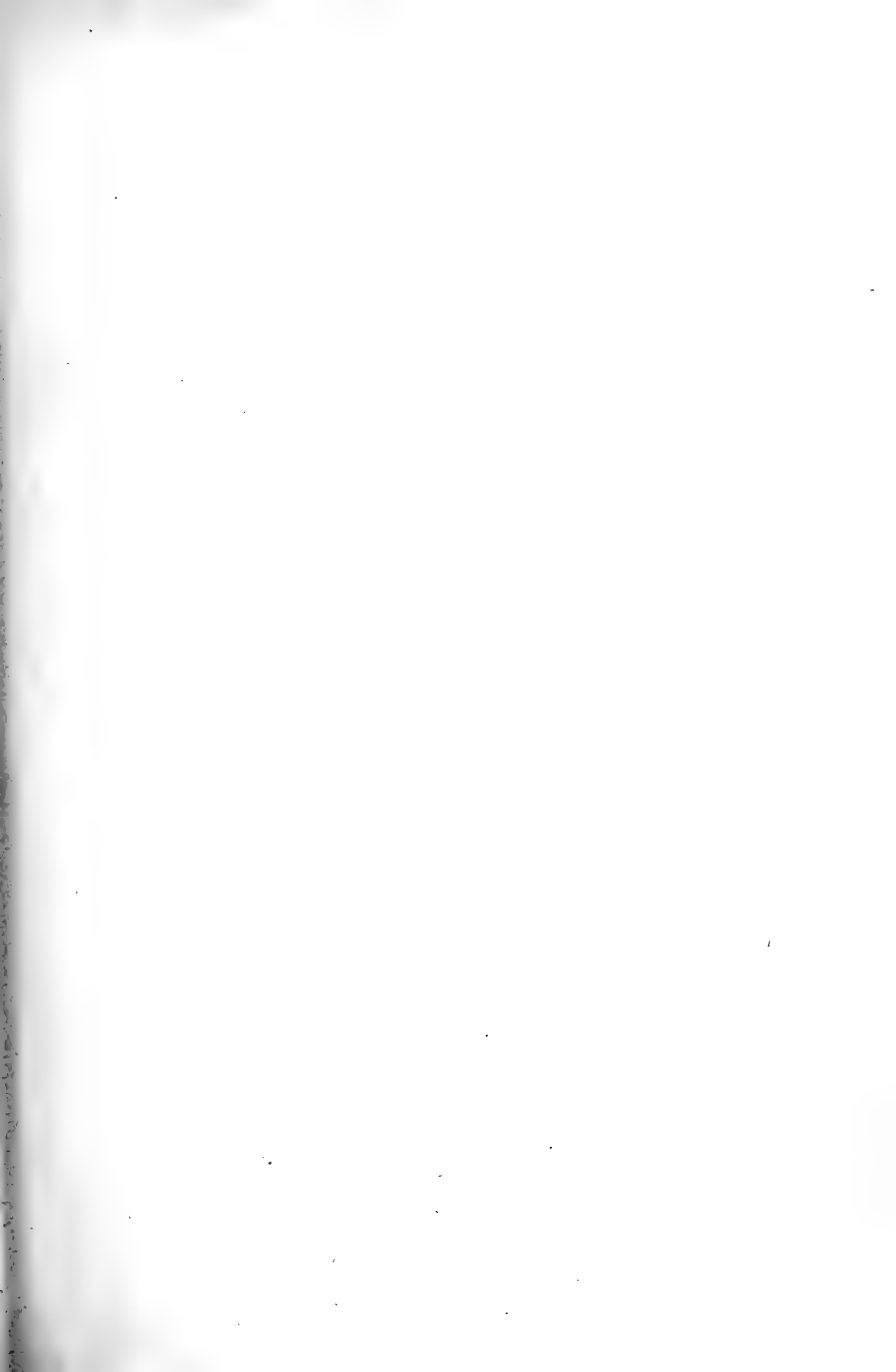
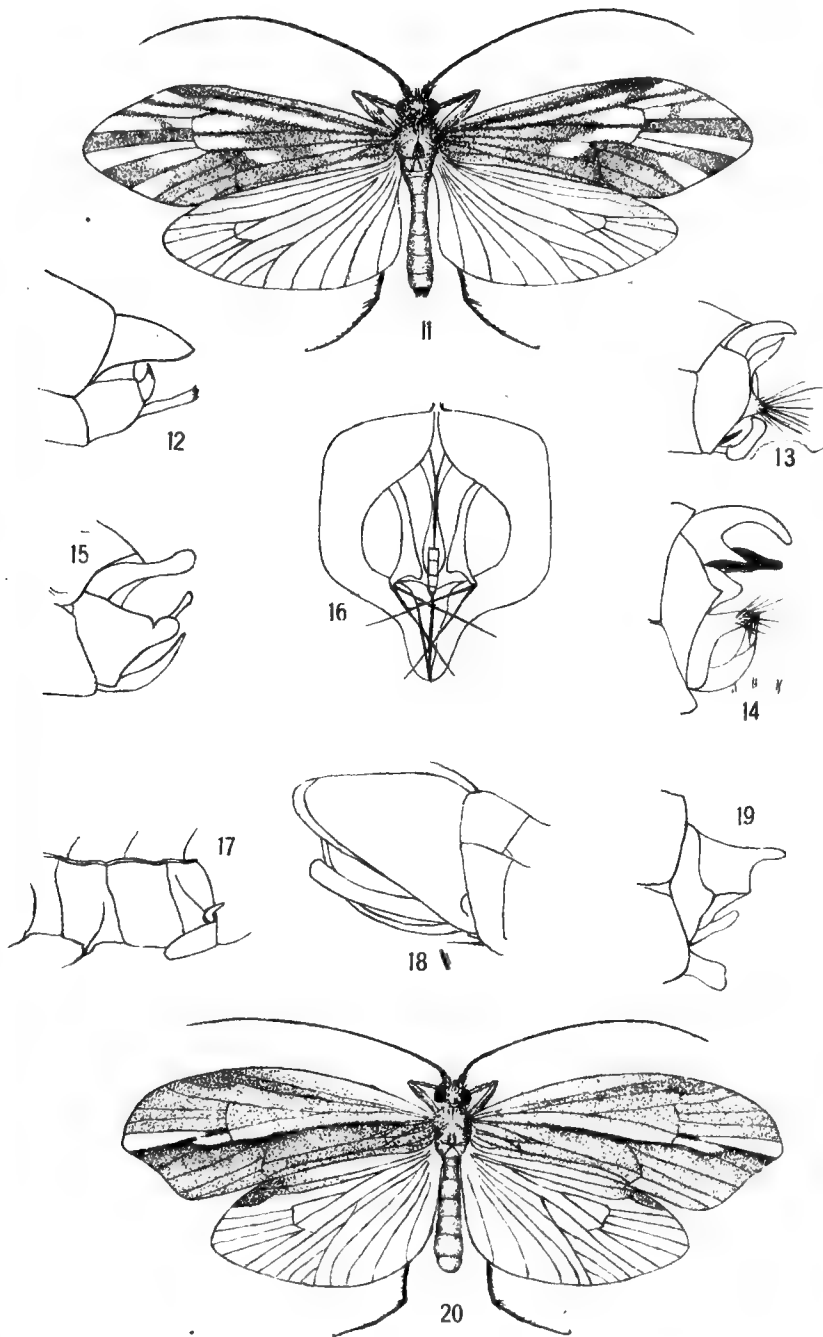


PLATE XII.

[Proc. Wash. Acad. Sci., Vol. II, Pl. XXVIII.]

- FIG. 11. *Asynarchus flavicollis*, insect.
12. *Limnephilus nebulosus*, ♂ genitalia.
13. *Asynarchus flavicollis*, ♂ genitalia.
14. *Limnephilus perjurus*, ♂ genitalia.
15. *Limnephilus sitchensis*, ♂ genitalia.
16. *Asynarchus alascensis*, ♂ genitalia.
17. *Glossosoma alascensis*, venter.
18. *Glossosoma alascensis*, genitalia.
19. *Halesus alascensis*, ♂ genitalia.
20. *Halesus alascensis*, insect.



ALASKA NEUROPTEROIDS

COLEOPTERA OF THE EX-
PEDITION

The following paper on the Coleoptera of the Expedition, by E. A. Schwarz, U. S. Department of Agriculture, was originally published in the Proceedings of the Washington Academy of Sciences, vol. 11, pp. 523-537, Dec. 20, 1900. It is here reprinted from the same electrotpe plates, so that it may be quoted exactly as if it were the original. The original pagination has been preserved and transferred to the inner or hinge side of the page, where it is enclosed in brackets, thus [524]; while the consecutive pagination of the present volume has been added in the usual place. The present headpiece and title have been substituted for the running heading of the Academy's Proceedings and the original title, which was: *Papers from the Harriman Alaska Expedition. xviii. Entomological Results (12): Coleoptera.* No other alterations have been made.

EDITOR.



COLEOPTERA OF THE EXPEDITION

BY E. A. SCHWARZ

THE Coleopterous fauna of Alaska is much better known than that of any of the other orders of insects of that territory, at least so far as the region along the southern and southeastern coasts is concerned, and Count C. G. von Mannerheim, in his often quoted series of papers,¹ enumerates and describes (in conjunction with Professor F. W. Mæklin) not less than 540 species. Subsequently to these early investigations by Russian explorers only a few additional species have been discovered in these regions. In 1894 the late Dr. John Hamilton² published a systematically arranged catalogue of the Coleoptera from Alaska which brings the total number of species to about 580. This includes, however, a small number of imperfectly known or not yet identified species described by the earlier authors. Owing to the large number of species already known from southern Alaska, and also to the difficulty in thoroughly exploring the Coleopterous

¹Beitrag zur Käfer-fauna der Aleutischen Inseln, der Insel Sitka und Neu-Californiens. Bull. Soc. Imp. Nat. Moscow, vol. 16, 1843. Nachträge zur Käferfauna d. Aleut. Inseln und d. Sitka, I-III, l. c. vol. 19, 1846, vol. 25, 1852; and vol. 26, 1853.

²Catalogue of the Coleoptera of Alaska, with the synonymy and distribution. Trans. Amer. Entom. Soc., vol. 21, 1894, pp. 1-38.

fauna in these boreal regions during the short period of two months, it was not to be expected that very extensive additions to the knowledge of Alaska Coleoptera would be made during the Harriman Alaska Expedition, when usually only one day or only a few hours were spent in collecting at each particular locality. Still the number of species (155) collected by Professor Kincaid under these unfavorable circumstances is surprisingly large and gives great credit to his industry and circumspection.

The bibliography and distribution of the described Alaska Coleoptera has been fully given by Dr. Hamilton, and since his paper (quoted above) is of such recent date and so readily accessible, it has been deemed advisable to give here simply the list of the species collected by the expedition.

Family CARABIDÆ.

Cychrus angusticollis Fischer.

Sitka, June 16, 4 specimens.

Cychrus angusticollis var. **velutinus** Mannerheim.

Sitka, June 16, 1 specimen; Yakutat, June 21, 3 specimens; Kadiak, July 20, 2 specimens; Saldovia, July 21, 3 specimens; Orca, June 27, 1 specimen.

Cychrus marginatus Fischer.

Sitka, June 16, 4 specimens; Kadiak, July 20, 1 specimen; Unalaska (no date). The specimen from Unalaska has the elytral striation more interrupted.

Carabus tædatus race **baccivorus** Fischer.

Kadiak, July 1 and July 20, 3 specimens; Yakutat, June 21, 1 specimen.

Nebria mannerheimii Fischer.

Sitka, June 16, 4 specimens; Muir Inlet, June 9, 13 specimens.

Nebria gregaria Fischer.

Sitka, June 16, 1 specimen; Yakutat, June 21, 1 specimen.

Nebria metallica Fischer.

Muir Inlet, June 9, 6 specimens.

Nebria kincaidi Schwarz sp. nov.

Elongate, apterous, shining, black, elytra metallic cupreous-green, mouth-parts and tarsi piceous, two spots between the eyes red. Head large, smooth, frontal impressions obsolete; antennæ long and slender, reaching beyond the middle of the elytra. Thorax small, wider than long (but much less so than in the allied species), sides moderately rounded in front, strongly sinuately narrowed toward the hind angles which are distinctly acute and slightly prominent posteriorly; lateral margin moderately wide and moderately reflexed; transverse and longitudinal impressions well-marked; along the side margin and within the basal impressions sparsely rugosely punctured. Elytra oblong-oval, humeri entirely obsolete; sides regularly arcuate; at their widest portion distinctly wider than the thorax; transversely and longitudinally more convex than in the allied species; surface rather deeply striate, striæ faintly punctulate, interstices slightly convex, third stria with three dorsal punctures, seventh interstice interrupted by two or three larger punctures. Prosternal process feebly lanceolate, horizontal, with distinct marginal line which is interrupted at the tip. Metepisterna short, about one-fourth longer than their width in front. Abdomen with the rows of ambulatorial setæ double. Length 11 mm.

Described from a single specimen collected at Farragut Bay, June 5, 1899.

Type.—Cat. no. 5258, U. S. National Museum.

On account of the obliteration of the elytral humeri this species belongs to group I of LeConte¹ and is allied to *N. ingens* and *N. ovipennis*, from either of which it is at once distinguished by its narrower and more convex form and the bright metallic color of the elytra.

Leistus ferruginous Mannerheim.

Sitka, June 16, 2 specimens; Yakutat, June 21, 1 specimen.

Bembidium complanulum Mannerheim.

Sitka, June 16, five specimens; Muir Inlet, June 12, 6 specimens; Kukak Bay, July 5, 1 specimen.

Bembidium incertum Mots. (*tetraglyptum* Mannerheim).

Popof Island, July 1, 1 specimen.

Bembidium bimaculatum Kirby.

Muir Inlet, June 12, 1 specimen.

Bembidium mutatum Harold & Gemminger.

Popof Island, July 1, 1 specimen. This is new to the fauna of Alaska. Specimens in the U. S. National Museum are from Mar-

¹Bull. U. S. Geol. and Geogr. Surv., VOL. III, no. 2, p. 474, 1878.

quette, Michigan; Veta Pass, Colorado; Banff, Alberta; New Hampshire (no definite locality), and Gros Ventre River, Wyoming.

***Bembidium spectabile* Mannerheim.**

Sitka, June 16, 1 specimen.

***Trechus chalybeus* Mannerheim.**

Kadiak, July 20, 1 specimen; Yakutat, June 21, 2 specimens; Popof Island, July 8, 1 specimen.

***Patrobus septentrionis* Dejean.**

Kadiak, July 20, 1 specimen.

***Patrobus aterrimus* Dejean.**

Sitka, June 16, 1 specimen.

***Pterostichus amethystinus* Dejean.**

Sitka, June 16, 17 specimens; Yakutat, June 21, 1 specimen; Metlakatla, June 4, 4 specimens.

***Pterostichus validus* Dejean.**

Sitka, June 16, 7 specimens.

***Pterostichus castaneus* Dejean.**

Sitka, June 16, 11 specimens; Juneau, June (no date), 2 specimens; Farragut Bay, June 5, 3 specimens.

***Pterostichus luzotii* Dejean.**

Muir Inlet, June 9, 21 specimens; Sitka, June 16, 2 specimens; Kukak Bay, July 5, 1 specimen; Yakutat, June 21, 2 specimens; Saldovia, July 21, 1 specimen; Popof Island, July 8, 1 specimen.

***Pterostichus orinomum* Leach.**

Berg Bay, June 10, 1 specimen; Kadiak, July 19, 1 specimen; Point Gustavus, June 16, 1 specimen; Yakutat, June 21, 1 specimen.

***Pterostichus riparius* Dejean.**

Yakutat, June 21, 2 specimens.

***Pterostichus riparius* Dejean var. ?**

Muir Inlet, June 9, 1 specimen; possibly a distinct species. (Elytral striæ deeper; color of upper side black.)

***Amara (Lirus) eschscholtzii* Chaudoir.**

Saldovia, July 21, 21 specimens.

***Amara hyperborea* Dejean.**

Popof Island, July 8, 1 specimen.

***Amara erratica* Sturm.**

Sitka, June 16, 1 specimen.

***Amara remotestriata* Dejean.**

Muir Inlet, June 9, 1 specimen.

***Calathus ingratus* Dejean.**

Muir Inlet, June 9, 13 specimens; Popof Island, July 13, 1 specimen; "Alaska Peninsula opposite Shumagin Islands" (C. Palache, collector), 3 specimens.

***Platynus erasus* LeConte.**

Farragut Bay, June 5, 1 specimen (broken).

***Bradycellus cognatus* Gyllh.**

Saldovia, July 21, 7 specimens.

***Tachycellus nigrinus* Dejean.**

Metlakahtla, June 4, 1 specimen.

Family DYTISCIDÆ.***Deronectes griseostriatus* DeGeer.**

Muir Inlet, June 9, 8 specimens.

***Hydroporus signatus* Mannerheim.**

Muir Inlet, June 12, 1 specimen; Yakutat, June 21, 2 specimens; Popof Island, July 10, 1 specimen.

***Hydroporus tristis* Paykull.**

Virgin Bay, June 26, 2 specimens; Kukak Bay, July 1, 2 specimens.

***Hydroporus axillaris* Aubé.**

Popof Island, July 10, 2 specimens.

***Ilybius quadrimaculatus* Aubé.**

Kukak Bay, July 9, 2 specimens.

***Agabus hypomelas* Mannerheim.**

Saldovia, July 21, 1 specimen; Yakutat, June 21, 8 specimens; Orca, June 25, 1 specimen.

***Agabus tristis* Aubé.**

Yakutat, June 21, 3 specimens; Popof Island, July 15 and 16, 3 specimens. Two from the latter locality have the upper side entirely black save a small spot on the front angles of the thorax.

Agabus semipunctatus Kirby.

Popof Island, July 16, 1 specimen.

Agabus scapularis Mannerheim.

Popof Island, July 5, 9, 10 and 16, 24 specimens.

Agabus lecontei Crotch.

Kukak Bay, July 1, 2 specimens; Popof Island, July 10, 2 specimens.

Rhantus binotatus Harris.

Fox Point, July 2, 1 specimen; Sitka, June 16, 1 specimen. Both specimens are females, and the determination is therefore not quite reliable.

Rhantus bistriatus Bergst.

Popof Island, July 13, 1 specimen. A single female but no doubt belonging to this species. Has not been reported before from Alaska.

Dytiscus dauricus Gebler.

Popof Island, July 11, a single female specimen with sulcate elytra.

Family GYRINIDÆ.**Gyrinus picipes** Aubé.

Yakutat, July 21, 5 specimens; Kukak Bay, July 1, 1 specimen.

Family HYDROPHILIDÆ.**Helophorus auricollis** Eschscholtz.

Popof Island, July 12, 1 specimen. Hitherto reported only from Unalaska.

Helophorus inquinatus Mannerheim.

Kukak Bay, July 1, 5 specimens.

Cercyon fimbriatus Mannerheim.

Kukak Bay, July 5, 3 specimens (black form).

Cercyon fulvipennis Mannerheim.

Farragut Bay, June 5, 1 specimen.

Cercyon lugubris Paykull.

Sitka, June 16, 1 specimen. This has not been recorded before from Alaska but there is no doubt that *Cybocephalus* ? *unicolor* Mots., described from the same locality (Bull. Moscou, 1845, vol. iv, p. 364) is to be referred to this cosmopolitan species.

Megasternum posticatum Mannerheim.

Farragut Bay, June 5, 1 specimen; Sitka, June 16, 1 specimen.

Family SILPHIDÆ.**Necrophorus pustulatus** Herschel.

Popof Island, July 15, 2 specimens.

Necrophorus vespilloides Herbst.

Kadiak, July 20, 1 specimen; Kukak Bay, July 1 and 5, 3 specimens.

Agyrtes longulus LeConte.

Sitka, June 16, 1 specimen; hitherto not recorded from Alaska. Known from northern California, Oregon and British Columbia (Massett, Queen Charlotte Island).

Choleva egena Horn.

Popof Island, July 15, 2 specimens; Sitka, June 16, 1 specimen.

Anisotoma curvata Mannerheim.

Yakutat, June 21, 1 specimen; Saldovia, July 21, 1 specimen.

Agathidium concinnum Mannerheim.

Yakutat, June 21, 1 specimen.

Scydmaenus californicus Motschulsky.

Yakutat, June 21, 1 specimen. Recorded from Sitka and Queen Charlotte Island. The type locality, 'California,' is probably incorrect.

Family STAPHYLINIDÆ.**Homalota picipennis** Mannerheim.

Sitka, June 16, 2 specimens.

Homalota sp.

Yakutat, June 21, 2 specimens.

Homalota graminicola Grav.?

Saldovia, July 21, 1 specimen.

Homalota sp.

Sitka, June 16, 1 specimen.

Homalota sp.

Popof Island, July 10, 1 specimen.

Homalota fucicola Maeklin.

Popof Island, July 15, 1 specimen.

Calodera sp.

Popof Island, July 7, 1 specimen.

Aleochara sulcicollis Mannerheim.

Saldovia, July 21, 1 specimen.

Bolitochara notata Maeklin.

Yakutat, June 21, 1 specimen.

Amblopusa brevipes Casey.

Kukak Bay, July 3, 1 specimen; Saldovia, July 21 and 28, 4 specimens.

Diaulota densissima Casey (*insolita* Casey).

Yakutat, June 21, 3 specimens.

Liparocephalus brevipennis Maeklin.

Yakutat, June 21, 2 specimens; Saldovia, July 21, 3 specimens; Virgin Bay, June 26, 1 specimen.

Liparocephalus cordicollis LeConte.

Taku Inlet, June 6, 1 specimen; Yakutat, June 21, 3 specimens.

Quedius capucinus Grav. var. **pediculus** Nord.

Sitka, June 16, 4 specimens; Saldovia, July 21, 1 specimen.

Quedius capucinus Grav. var. **marginalis** Maeklin.

Yakutat, June 21, 1 specimen.

Quedius laevigatus Gyllh. var. **plagiatus** Mannerheim.

Sitka, June 16, 2 specimens.

Creophilus maxillosus Linné.

Kukak Bay, July 1 and 5, 2 specimens.

Hadrotus crassus Mannerheim.

Kukak Bay, July 1, 1 specimen.

Philonthus siegwaldi Mannerheim.

Kukak Bay, July, 1 specimen; Yakutat, June 21, 1 specimen.

Cafius canescens Mannerheim.

Kukak Bay, July 5, 8 specimens; Popof Island, July 8, 10 specimens.

Baptolinus macrocephalus Nordman.

Yakutat, June 21, 11 specimens; Virgin Bay, June 26, 1 specimen; Sitka, June 16, 3 specimens; Farragut Bay, June 5, 2 specimens.

***Stenus insularis* Casey.**

Virgin Bay, June 26, 1 specimen; Yakutat, June 21, 1 specimen; Saldovia, July 21, 1 specimen. Not before recorded from Alaska; originally described from Vancouver Island; occurs also in Oregon and at Lake Tahoe, California.

***Stenus umbratilis* Casey.**

Metlakahtla, June 4, 2 specimens. Not previously recorded from Alaska; described from British Columbia.

***Tachinus nigricornis* Mannerheim.**

Sitka, June 16, 1 ♂ specimen.

***Tachinus* sp.**

Virgin Bay, June 26, 1 specimen. This is a female in poor condition but seems to indicate an undescribed species.

***Mycetoporus lepidus* Erichson.**

Popof Island, July 12, 1 specimen. The specimen is a mere fragment, but if correctly determined, the species is an addition to the fauna of Alaska. It occurs on Lake Superior, in Michigan, in Florida, Colorado, northern California, British Columbia, and Alberta.

***Oxytelus fuscipennis* Mannerheim.**

Popof Island, July 8, 9, 10 and 12, 8 specimens.

***Amphichroum testaceum* Mannerheim.**

Lowe Inlet, June 3, 2 specimens; Metlakahtla, June 4, 1 specimen; Sitka, June 16, 2 specimens; Yakutat, June 21, 1 specimen.

***Lathrimæum subcostatum* Maeklin.**

Yakutat, June 21, 1 specimen.

***Olophrum convexum* Maeklin.**

Popof Island, July 13, 2 specimens.

***Omalium foraminosum* Maeklin.**

Kukak Bay, July 5, 1 specimen.

***Anthobium pothos* Mannerheim.**

Lowe Inlet, June 3, 1 specimen; Metlakahtla, June 4, 1 specimen; Sitka, June 16, 2 specimens; Yakutat, June 21, 4 specimens; Kukak Bay, July 5, 17 specimens.

***Orobanus simulator* LeConte.**

Yakutat, 1 specimen. Not previously reported from Alaska; originally described from Mount Washington, New Hampshire, and

known to occur in the high mountains of Colorado and Utah, and also in Oregon and British Columbia.

***Microedus austinianus* LeConte.**

Muir Inlet, June 12, 25 specimens. The specimens are identical with typical specimens from Mount Washington, New Hampshire. This is the *Anthophagus laticollis*, var. *b* mentioned by Maeklin.

Family CRYPTOPHAGIDÆ.

***Atomaria vespertina* Maeklin.**

Sitka, June 16, 1 specimen.

Family NITIDULIDÆ.

***Epuræa linearis* Maeklin.**

Sitka, June 16, 18 specimens.

***Epuræa truncatella* Mannerheim.**

Sitka, June 15, 1 ♀ specimen.

***Epuræa planulata* Erichson.**

Sitka, June 16, 2 specimens.

***Epuræa æstiva* Linné.**

Sitka, June 16, 1 specimen; Kukak Bay, July 1, 2 specimens.

***Rhizophagus dimidiatus* Mannerheim.**

Sitka, June 16, 5 specimens; Yakutat, June 21, 1 specimen.

Family DERODONTIDÆ.

***Peltastica tuberculata* Mannerheim.**

Sitka, June 16, 3 specimens.

Family DASCYLLIDÆ.

***Cyphon variabilis* Thunberg.**

Saldovia, July 21, 3 specimens; Kukak Bay, July 1, 1 specimen.

Family ELATERIDÆ.

***Cryptophypnus littoralis* Eschscholtz.**

Kukak Bay, July 1 and 5, 3 specimens.

***Cryptophypnus hyperboreus* Gyllenhal.**

Muir Inlet, June 12, 1 specimen.

***Cryptophypnus nocturnus* Eschscholtz.**

Sitka, June 16, 2 specimens; Saldovia, July 21, 1 specimen.

Hypnoidus musculus Eschscholtz.

Lowe Inlet, June 3, 1 specimen; Virgin Bay, June 26, 1 specimen; Popof Island, July 8 and 12, 2 specimens.

Elater nigrinus Paykull.

Sitka, June 16, 1 specimen.

Megapenthes stigmatosus LeConte.

Fox Point, July 29, 3 specimens.

Athous ferruginosus Eschscholtz.

Saldovia, July 21, 4 specimens; Popof Island, July 7, 9, 10 and 13, 11 specimens; Kukak Bay, July 1 and 5, 2 specimens.

Corymbites resplendens Eschscholtz.

Yakutat, June 21, 1 specimen; Kadiak, July 5 and 20, 3 specimens.

Corymbites volitans Eschscholtz.

Sitka, June 16, 11 specimens.

Corymbites umbricola Eschscholtz.

Yakutat, June 21, 3 specimens.

Corymbites caricinus Germar.

Sitka, June 16, 1 specimen; Yakutat, June 21, 5 specimens; Kukak Bay, July 1 and 5, 8 specimens; Popof Island, July 7, 9 and 16, 6 specimens; Fox Point, July 27, 1 specimen.

Corymbites caricinus Germar var. ?

Kukak Bay, July 1 and 5, 7 specimens; Yakutat, June 21, 1 specimen.

Corymbites tarsalis Melsheimer.

Yakutat, June 21, 1 specimen.

Corymbites lobatus Eschscholtz.

Kukak Bay, July 1 and 5, 16 specimens.

Corymbites spectabilis Mannerheim.

Virgin Bay, June 26, 3 specimens; Kadiak, July 5, 1 specimen.

Corymbites sericeus Eschscholtz. ?

Port Clarence (B. E. Fernow), Yakutat, June 21, 1 specimen.

Sericosomus incongruus Lec.

Sitka, June 16, 1 specimen. Not previously reported from Alaska; occurs in New Hampshire (White Mountains), near Lake Superior, in the State of Washington (Tenino), and in Alberta (Banff).

Family BUPRESTIDÆ.**Melanophila appendiculata** Fabr.

Fox Point, July 29, 1 specimen.

Family LAMPYRIDÆ.**Eros hamatus** Mannerheim.

Yakutat, June 21, 6 specimens.

Eros lætus Mots.

Sitka, June 16. Not previously reported from Alaska; known to occur in Vancouver Island, Oregon, and northern California.

Podabrus scaber LeConte.

Yakutat, June 21, 1 specimen. Not previously recorded from Alaska; known to occur on Vancouver Island, in Oregon, British Columbia (Glacier Station) and on the Wahsatch Mountains of Utah (Alta).

Podabrus piniphilus Eschscholtz.

Lowe Inlet, June 3, 3 specimens; Farragut Bay, June 5, 1 specimen; Metlakahtla, June 6, 1 specimen; Sitka, June 16, 4 specimens; Yakutat, June 21, 2 specimens.

Podabrus sericatus Mannerheim.

Sitka, June 16, 1 specimen.

Silis pallida Mannerheim.

Sitka, June 16, 3 specimens.

Telephorus fraxini Say.

Popof Island, July 8 and 15, 5 specimens.

Telephorus divisus LeConte.

Farragut Bay, June 5, 2 specimens. Not previously known from Alaska; occurs in northern California, Oregon, Washington, Vancouver Island and Queen Charlotte Islands.

Family SCARABÆIDÆ.**Aphodius congregatus** Mannerheim.

Virgin Bay, June 26, 1 specimen; Kadiak, July 5, 1 specimen (L. Cole, collector); Popof Island, July 16, 2 specimens; Saldovia, July 21, 1 specimen.

Family SPONDYLIDÆ.**Spondylis upiformis** Mannerheim.

Sitka, June 16, 1 specimen.

Family CERAMBYCIDÆ.***Leptalia macilenta* Mannerheim.**

Popof Island, July 7, 8, 9 and 10, 28 specimens; Kukak Bay, July 1 and 15, 30 specimens; Virgin Bay, June 26, 1 specimen.

***Pachyta monticola* Randall.**

Fox Point, July 29, 2 specimens.

***Pachyta liturata* Kirby.**

Saldovia, July 21, 1 specimen.

***Acmaeops pratensis* Laich.**

Saldovia, July 21, 1 specimen.

Family CHRYSOMELIDÆ.***Donacia femoralis* Kirby.**

Metlakahtla, June 4, 1 specimen; Sitka, June 16, 1 specimen; Kadiak, July 19, 1 specimen; Popof Island, July 10, 12, 13, 15, 4 specimens.

***Syneta carinata* Mannerheim.**

Sitka, June 16, 8 specimens.

***Chrysomela subsulcata* Mannerheim.**

Popof Island, July 13, 1 specimen. Hitherto recorded only from the Pribilof Islands in Bering Sea.

Family CEDEMERIDÆ.***Ditylus quadricollis* LeConte.**

Yakutat, June 21, 1 specimen. Not previously known from Alaska; reported from middle California (Santa Cruz Mountains), Oregon (Astoria), Washington (Easton) and British Columbia (North Bend and Queen Charlotte Islands).

Family MORDELLIDÆ.***Anaspis sericea* Mannerheim.**

Saldovia, July 21, 2 specimens.

***Anaspis rufa* Say.**

Saldovia, July 21, 1 specimen.

Family ANTHICIDÆ.***Anthicus nigrita* Mannerheim.**

Saldovia, July 21, 2 specimens.

Family CURCULIONIDÆ.**Sitones tibialis** Herbst.

Kukak Bay, July 5, 1 specimen. This circumpolar species has not before been reported from Alaska; but it is common on Vancouver Island, in Washington, Oregon, Utah, Colorado, Canada, Michigan; also recorded from Bering Island.

Trichalophus constrictus LeConte.

Yakutat, June 21, 1 specimen.

Paraplinthus carinatus Bohman.

Sitka, June 16, 1 specimen; Yakutat, June 21, 1 specimen; Virgin Bay, June 26, 1 specimen; Kadiak, July 19, 1 specimen; Saldovia, July 29, 1 specimen.

Paraplinthus scrobiculatus Mannerheim.

Sitka, June 16, 1 specimen; Virgin Bay, June 26, 1 specimen.¹

Dorytomus longulus LeConte.

Popof Island, July 11, 12, 15, 5 specimens; Kukak Bay, July 5, 1 specimen; Saldovia, July 21, 2 specimens.

Dorytomus mannerheimi Gemminger (*vestitus* Mannerheim).

Yakutat, June 21, 6 specimens.

Trachodes ptinoides Germar.

Yakutat, June 21, 5 specimens; Kukak Bay, July 5, 5 specimens; Saldovia, July 21, 1 specimen.

Trachodes quadrituberculatus Mots.

Virgin Bay, June 26, 2 specimens; Yakutat, June 21, 1 specimen.

Orchestes rufipes LeConte.

Kukak Bay, July 5, 12 specimens. Not previously recorded from Alaska, but widely distributed in the northern States from Massachusetts to the Pacific Coast.

Family CALANDRIDÆ.**Rhyncholus brunneus** Mannerheim.

Sitka, June 16, 6 specimens.

¹The distribution of this species is but imperfectly understood, but it does not seem to occur in British Columbia or farther south (cf. J. Faust: Notizen ueber Ruesselkäfer, Stett. Ent. Ztg., VOL. LIII, pp. 49, 50, 1892).

Family SCOLYTIDÆ.

Hylurgops rugipennis Mannerheim.

Farragut Bay, June 5, 1 specimen; Sitka, June 16, 3 specimens.

Dendroctonus obesus Mannerheim.

Sitka, June 16, 3 specimens. This is probably specifically different from *D. rufipennis* Kirby and confined to the northwestern region of North America. The precise distribution cannot be given at present.

Pityophthorus nitidulus Mannerheim.

Sitka, June 16, 1 specimen.

Dryocætus autographus Ratzeburg.

Sitka, June 16, 1 specimen; Yakutat, June 21, 10 specimens.

Xyloterus bivittatus Kirby.

Sitka, June 16, 4 specimens.

**METAMORPHOSES OF SOME
ALASKA COLEOPTERA**

(187)

The following paper on the Metamorphoses of some Alaska Coleoptera, by Trevor Kincaid, Professor of Biology, University of Washington, Seattle, was originally published in the Proceedings of the Washington Academy of Sciences, vol. II, pp. 367-388, Nov. 24, 1900. It is here reprinted from the same electrotpe plates, so that it may be quoted exactly as if were the original. The original pagination has been preserved and transferred to the inner or hinge side of the page, where it is enclosed in brackets, thus [368]; while the consecutive pagination of the present volume has been added in the usual place. In the plates the original numbers and running headline, slightly abbreviated, have been preserved [in brackets], while the volume designation and serial plate numbers have been added in the usual place. The original text references to the plates are unchanged. The present headpiece and title have been substituted for the running heading of the Academy's Proceedings and the original title, which was: *Papers from the Harriman Alaska Expedition. VIII. Entomological Results (2): The Metamorphoses of some Alaska Coleoptera.* No other alterations have been made.

EDITOR.



THE METAMORPHOSES OF SOME ALASKA COLEOPTERA

BY TREVOR KINCAID

THE study of the adult forms of the Coleoptera presents such a vast field and is of such a fascinating character that but scant attention has been paid to the early stages of the members of this order. This is especially true in America, where very little has been published on this subject, and as a result we know but little concerning the structure or peculiar habits of the larvæ of our indigenous beetles. In the U. S. National Museum is a large collection of coleopterous larvæ, accumulated mainly through the efforts of Mr. E. A. Schwarz, of that institution, but the majority of the species have never been described.

An opinion is prevalent that it is extremely difficult to rear the larvæ of beetles, but the writer believes this supposition to be exaggerated. It is certainly difficult to rear them from the egg or very young stages, but if specimens be taken when nearly full grown and carefully tended they may be bred without excessive mortality.

Under the circumstances, the writer feels that the following paper will not be unwelcome, although it may be imperfect in some respects, owing to the fact that no comparison has been possible, in the majority of cases, with closely related forms.

The species dealt with in this paper are as follows :

Carabus truncaticollis Fisch.

Dytiscus dauricus Gebler.

Agabus tristis Aubé.

Byrrhus fasciatus Fabr.

Hypnoides musculus Esch.

Cryptohypnus littoralis Esch.

Leptalia macilenta Mann.

Chrysomela subsulcata Mann.

Lepidophorus lineaticollis Kirby.

CARABUS TRUNCATICOLLIS Fisch.

[Plate XXII.]

Larva entirely jet black except the areas between the schlerites on the ventral surface, surface shining, delicately reticulate, five times as long as broad, subcylindrical, tapering slightly at either end, strongly convex above, flattened below. Length 20 mm.

Head broader than long, as wide as the anterior margin of pronotum; frontal sulci strong and broad, surrounding the epistoma; median area of epistoma broad, convex, a little depressed in the center, lateral areas bent obliquely upward; frontal angles well defined, subrectangular, broader by one-third than the clypeus but not exceeding the latter, projecting obliquely upwards, apex rounded, outer margin below apex sinuate, anterior margin arcuate; incisure between angles and clypeus broad and rounded. Clypeus subtriangular in form, transversely ridged on posterior margin, deeply foveate in the center, the fovea bounded on each side by a strong oblique ridge; anterior margin strongly produced, horizontal, quadridentate, the teeth stout, sharp, directed forward, the middle pair the larger and projecting considerably beyond the lateral teeth but not exceeding the frontal angles of the head. Antennæ as long as the mandibles, four-jointed, basal joint subglobular; second more elongate, slightly enlarged towards tip; third as long as second, more slender, with a few hairs at apex; fourth one-half as long as third, slender, oval. Ocelli six, arranged on the perimeter of a well-defined, transversely-oval tubercle, situated just posterior to the antennæ. Mandibles stout,

deeply bidentate, outer margin evenly arcuate; outer tooth long tapering, rather sharp at apex; inner tooth shorter, more robust, anterior margin arcuate, curving inwards at right angles. Maxillæ stout, exceeding the mandibles in length; cardo narrow, wedge-shaped; stipes subquadrangular, the angles rounded, one and one-half times as long as broad, the inner margin ciliate and with a minute conical papilla near the upper angle; galea not quite reaching to apex of second joint of maxillary palpi, composed of two subequal joints, the basal joint a little the larger; maxillary palpi four-jointed, first joint broader than long, second and third subequal, fourth slightly longer than third. Mentum projecting, almost reaching the apices of the maxillary stipes, one and three-fourths times as broad towards apex as at base, apex conical; labial palpi stout, composed of two subequal joints, the second a little the longer and not divided at the apex.

Pronotum trapezoidal, narrower in front by one-sixth than at base, nearly as broad at base as long, sides straight with a longitudinal groove close to the lateral margins; anterior and posterior angles narrowly rounded, mesonotum transverse, about one-half as long as pronotum but a little broader and with a small deep fovea on the disk of the scute towards each side. Metanotum similar to the mesonotum but a little broader. Legs of moderate size, strongly spinose.

Dorsal scutes of first eight abdominal segments transverse, subequal in length, sides distinctly margined, posterior angles acutely rounded; pleural scutes two on each side of a segment, elongate, parallel; ventral scutes four to each segment, anterior one broadly fusiform, transverse, posterior quadrangular, broader than long, lateral scutes subquadrangular, one on each side of the posterior; ninth abdominal segment much narrower than eighth, rounded at the sides, finely tuberculate, emarginate behind; cerci stout, finely tuberculate, three-fourths as long as eighth segment, diverging slightly, curving gently upwards and bearing dorsally near the middle a pair of small conical projections of which the innermost is the larger.

Pupa white, except eyes and jaws, which are black; setæ and hairs entirely absent; form elongately ovate, broadest in the middle. Length 14 mm.

Described from larvæ and pupæ found beneath beds of moss on St. Paul Island, Alaska, during the month of August.

The metamorphoses of none of the American representatives of this genus have been described, so that no comparison is possible with the related American species. The most marked specific characters are in the peculiar structure of the clypeus and the undivided character of

the apical joint of the labial palpi. In most of the European species the labial palpi of the larva are cleft at the apex.

DYTISCUS DAURICUS Gebler.

[Plate XXIII, figs. 1 and 2.]

Larva slender, subcylindrical, strongly convex above, flattened beneath, elongately fusiform; yellowish white, the head and schlerites mottled with pale brown. Length 50 mm.

Head rounded, a fifth longer than broad, flattened in front, convex behind; clypeus broad arcuate, anterior margin with a row of delicate lamellate setæ; frontal sulci shallow, converging behind; hypostoma deeply excavated; temples rounded, unarmed; collar half as wide as head, separated from the latter by a well-marked groove, truncately emarginate above, deeply angularly emarginate beneath; ventral furrow of neck broadening anteriorly, basally with a strong median carina, at the extremity of which there is on each side a small rounded eminence. Antennæ three-fourths as long as the head, slender setaceous, composed of three principal and three small accessory joints; first principal joint twice as long as third; second intermediate in length between first and third; accessory joints successively smaller, the first situated at the base of the antennæ, second between the first and second principals, third between the second and third principals. Ocelli six, arranged on the perimeter of a transversely oval convex eminence situated on the sides of the head close behind the antennæ; above each group of ocelli there is a small, but very prominent, shining papilla. Mandibles three-fourths as long as the head, slender, tapering, slightly curved, apex acute. Maxillæ longer than the antennæ; stipes slender, palpiform cylindrical; lacinia minute, papilliform; maxillary palpi more than twice as long as stipes, composed of three principal and three accessory joints; the principal joints successively shorter, the accessory joints successively smaller, the first situated between the stipes and first principal joint, the second between the first and second principals, and the third between the second and third principals. Mentum broad, bilobed, emarginate in front; ligula absent; labial palpi half as long as maxillary palpi, three-jointed, the first joint elongate, slender, the second and third short, subequal.

Pronotum longer than broad, nearly twice as wide at base as at apex, transversely grooved on each side towards anterior margin; sides sharply margined, bent downwards and inwards touching the coxæ of the anterior legs; mesonotum and metanotum half as long

as pronotum, transverse, not deflexed; prosternum with a large rounded schlerite between the bases of the anterior legs.

Feet slender, elongate, sparsely armed beyond the coxæ with small short spines; coxæ nearly as long as femora; tibia two-thirds as long as the femora; femora and tibiæ densely ciliate above and below; tarsi half the length of the tibiæ; claws short, unarmed.

Abdomen tapering gradually from first segment to apex; ninth segment three times as long as broad, truncate at apex, bearing distally a pair of lamellate cerci which are densely ciliate; eighth and ninth segments laterally with a row of long ciliæ.

Described from larvæ taken at Yakutat and Kukak Bay. The transformation of this species takes place in the earth beneath stones lying along the shores of the ponds inhabited by the larvæ and adults. The larvæ resemble very closely those of the allied species *Dytiscus marginales* L. and differ only in a few small details; the body is more convex than in the latter species, the posterior margin of neck is emarginate above and the furrow on the ventral surface of the neck is strongly carinate.

AGABUS TRISTIS Aubé.

[Plate XXIII, figs. 3-6.]

Larva elongately ovate, acuminate behind, convex above, flattened beneath, dorsal surface light brown mottled with yellowish, ventral surface white. Length 12 mm.

Head rounded, convex above, flattened beneath, delicately reticulate, posterior angles broadly rounded; neck short, the sinus between the latter and head deep; frontal angles strongly produced, obtusely rounded at apex; clypeus transverse, rounded in front, bordered anteriorly with a row of delicate lamellate setæ; frontal sulci faintly marked, surrounding the epistoma, which is slightly convex, circular and depressed in the middle; sides of temples acutely carinate, the margin serrate and spinulose. Mandibles slender, tapering, evenly curved on both external and internal margins, apex rather sharp, suctional orifice close to tip on inner surface. Antennæ not half as long as head, slender, setaceous, four-jointed, the joints successively shorter. Ocelli six, arranged on an oval prominence situated on the side of the head just behind the antennæ; the two anterior ocelli are round, the remaining four more or less elongate. Maxillæ elongate, slender; stipes twice as long as broad, external margin sinuate; galea consisting of a small, slender, finger-shaped joint not much longer than the basal joint of the palpus; maxillary palpus reaching

almost to apex of antennæ, four-jointed, basal joint squarish in outline, the remaining joints successively shorter. Mentum exerted, corneous, transverse, trapezoidal, three times as broad as long, anterior border straight and wider than at base; labial palpi as long as the second and third joints of the maxillary palpi combined, slender, two-jointed, the first joint longer than the second; ligula absent.

Pronotum a little longer than wide, broadly ovate, narrowed somewhat in front, angles rounded, convex above, finely reticulate, sides distinctly margined. Mesonotum and metanotum transversely oval, three times as wide as long, sides broadly rounded; sterna not chitinized, folded.

Legs slender, elongate, with numerous short spines; coxæ stout, elongate, unarmed, femoral groove distinct, carinated; femora as long as coxæ, more slender, compressed, sparsely setose; tibiæ two-thirds as long as the femora, sparsely setose; tarsi nearly as long as tibiæ, claws long and slender.

Abdominal segments gradually diminishing in size from the first to the sixth; dorsal scutes transversely oval, angles rounded; segments seven and eight are entirely corneous; eighth segment slender, elongate, conical, bearing at apex two cerci that are about as long as the last two segments of the abdomen; the cerci are more or less ciliated apically and at the nodes; segments six to eight are finely tuberculate above; spiracles in abdominal segments one to six are situated at the lateral margins of the schlerites and are visible from above.

Pupa pure white; front of face flattened, concave between the eyes; occiput transversely ridged, with a row of bristles extending from one eye to the other. Length 8 mm. Described from larvæ and pupæ found under a stone on the margin of a small pond near the Muir Glacier.

No description appears to have been published of the metamorphoses of any of the American species of *Agabus*.

BYRRHUS FASCIATUS Fabricius.

[Plate XXIV.]

Larva pale brown, lighter between the schlerites; form elongate, cylindrical; outline in side view a flattened curve. Length 18 mm.

Head rounded, shining, globose, almost as broad as the pronotum, heavily punctured and with scattered hairs on the front and vertex. Clypeus broadly transverse, trapezoidal, frontal margin truncate

Labrum semicircular in form, with a row of bristles along the anterior margin. Antennæ short, not exceeding the labrum, three-jointed; first joint cylindrical, not quite twice as long as broad; second more slender and a little longer; third one-fourth as long as the second, more slender, conical. Ocelli five, in two series; first series a group of three, arranged in a triangle behind the antennæ; second series a group of two, cephalo-ventrad of the first, the uppermost ocellus hardly one-half as large as its companion; jaws stout, subtriangular, apex bluntly rounded; inner margin with a blunt, faintly indicated tooth near the middle; articular condyle at the extreme outer angle. Maxillæ not exceeding the jaws; cardo triangular, imperfectly chitimized; stipes twice as long as broad, with a few scattered hairs, produced apically into a triangular lacinial process which is nearly straight outwardly and oblique on the internal margin, the latter being densely set with setæ and hairs; galea springing from the base of the lacinial process and not greatly exceeding that structure, finger-shaped, curving inwardly, two-jointed, the basal joint obscurely indicated and quadrangular in form, second joint ovate, bluntly rounded at apex, which is crowned with a group of stout setæ. Mentum truncate in front, broadening behind, anterior margin bearing four long hairs; labial palpi short, slightly exceeding mentum, composed of two joints, the basal joint large and fleshy, the apical joint small, conical; ligula wanting.

Pronotum extremely convex, nearly as long as the mesonotum and metanotum combined, densely and coarsely punctured, except a narrow band on the posterior margin which is shining and longitudinally striate, clothed with scattering, elongated hairs; lateral margins strongly incurved, tapering to a rounded tip which reaches the coxæ of the anterior legs. Mesonotum short, transverse, obliquely truncate at the lateral margins, which barely reach the coxæ of the middle legs; transversely ridged; punctured, but not so strongly as in the pronotum; two transverse rows of hairs, blending in the middle, extending across the scute from side to side. Metanotum resembling the mesonotum but with two transverse ridges instead of one, and with a series of long hairs on each ridge, the series joining towards the sides of the scute; lateral margins broadly rounded, distant from the posterior coxæ; venter with a small oval schlerite between the bases of the posterior legs.

Legs short, densely setate and hairy; coxæ large, cylindrical excavated externally; femora and tibiæ subequal, not as long as coxæ; tarsal claws simple.

Abdominal segments from fifth to seventh cylindrical, subequal; dorsal scutes transversely oval, lateral margins rounded, traversed by two delicate transverse ridges each of which bears a series of long hairs, the two series uniting towards the outer margin; pleural schlerites two on each side, convex, prominent, oval, oblique; ventral schlerites five on each segment, convex, corneous, the anterior large, cordate, the posterior pair triangular, the lateral pair elongately ovate; eighth segment resembles seventh but is longer, the ridges are absent and the rows of hairs are not so clearly defined, the lateral scutes are reduced to one and the ventral scutes are small and indistinct. The ninth abdominal segment is nearly as large as the pronotum but smooth and shining, semicircular in outline, the posterior margin projecting over and hiding from view the anal structures, a row of hairs along the outer border; anal organ circular, convex, triangularly fissured, thus forming three papillæ, the posterior pair of papillæ bearing disc-shaped depressions serving in locomotion.

Described from larvæ found beneath moss on St. Paul Island, Alaska, in the month of August. The larvæ construct small chambers in the soil in which they lie, and from the fact that the imagoes were emerging at the time they came under observation, the adults probably winter over in the burrows. The mandibles of the young larva differ considerably from those of the adult, and a figure of the former is given for comparison.

What purports to be a description of the larva of *Byrrhus fasciatus* Fabr., is given by Xamheu,¹ but as there appear to be some structural differences between the larva described by the above writer from France and those taken in Alaska, it was deemed advisable to describe and figure the latter carefully in order to furnish a basis for comparison between the American and European forms. As no figures are given by Xamheu, it is difficult to make a detailed comparison at present.

HYPNOIDES MUSCULUS Esch.

[Plate XXV, figs. 3-7.]

Larva white except head, pronotum, and terminal abdominal segment, which are yellow; form elongate, slender, cylindrical, tapering but slightly at either end. Length 7 mm.

Head squarish in outline, narrower than the pronotum, flattened above and beneath, smooth with a few scattered hairs. Clypeus

¹Ann. Soc. Linn. Lyon., XLII, p. 60, 1896.

rounded in front, the anterior margin bearing three teeth of equal length and size. Antennæ three-fourths as long as the jaws; three-jointed; first and second joint of nearly equal size, the third shorter and more slender with a small accessory article by its side. Ocelli on the side of head close behind antennæ. Mandibles of moderate size, tapering, curving inward sharply from about the middle, apex acute, inner margin with a moderately sized tooth close to the tip, the posterior margin of this latter tooth with a row of five or six fine dentations. Maxillæ elongate, extending beyond the tips of the mandibles; stipes very large, inner margin straight, outer margin arcuate, two and one-half times as long as broad, anterior portion of inner margin densely hairy; galea finger-shaped, uniarticulate, reaching to apex of second joint of maxillary palpi; maxillary palpi of moderate length, composed of four successively smaller joints. Mentum six times as long as broad, rounded at the anterior margin which bears in the middle a single stout seta; labial palpi rather long, three-jointed, the joints successively smaller. Pronotum squarish in outline, the chitinized schlerite twice as broad as long; mesothorax and metathorax shorter than the prothorax, the dorsal schlerites delicately chitinized. Legs short, with numerous short setæ. Abdominal segments from the first to eighth without distinctly chitinized schlerites, their lateral margins bearing a few elongate hairs; ninth abdominal segment slightly longer than broad, anterior angles rounded, tapering posteriorly, terminal processes simple; sides of the schlerite with a distinctly raised, smooth rim inclosing the somewhat depressed discal area within which is a smooth and shining posterior emargination transversely oval almost inclosed by the incurved apices of the terminal processes; sides with a few long, slender hairs. Pupa white; pronotal area greatly inflated, arcuate at the sides; wing-pads reaching to apex of first abdominal segment; anal segment bearing at its posterior extremity two sharp styliform processes. Length 5 mm.

Described from larvæ and pupæ found beneath stones along the seashore. Popof Island, Alaska, July 10, 1899.

CRYPTOHYPNUS LITTORALIS Esch.

[Plate XXV, figs. 1 and 2.]

Larva reddish above, yellow beneath; entirely corneous, eight times as long as broad, convex above and below, tapering slightly at either end. Length 15 mm.

Head slightly narrower than the anterior margin of pronotum,

broader at base than long. Clypeus tridentate, the teeth sharp and equal. Mandibles bidentate, the inferior tooth considerably shorter than apical, both teeth sharp at apex. Antennæ three-jointed, the joints successively shorter. Maxillæ reaching to tip of mandibles; stipes three times as long as broad; maxillary palpi one-fourth the length of stipes, three-jointed, the joints gradually diminishing in size. Mentum four times as long as broad, half as broad as stipes, not narrowed behind, anterior margin rounded; labial palpi small, two-jointed, conical.

Pronotum smooth, shining, longer than broad, slightly narrowed in front, anterior margin straight, sides curved downward, but not margined. Mesonotum and metanotum transverse, twice as broad as long. Legs short, thickly setate.

Abdominal segments from first to eighth broader than long, subequal; dorsal scutes punctured and with numerous short transverse striæ, sides not margined; impressed median line strongly developed. Ninth abdominal segment longer than broad at base, tapering slightly, anterior angles strongly punctured; posterior emargination broad, transversely oval; lateral margins with a strongly raised ridge bearing externally three equidistant rounded tubercles, the proximal one the smallest, the second and third successively larger; central area flattened, not deeply depressed, impunctate, with light irregular ridges passing from the sides towards the center, a shallow median groove extending from the posterior margin to the middle; cerci strong, bifurcated, the terminal projection sharp, slender, curving strongly inward, the lateral projection shorter, stouter, at right angles to the terminal process.

Described from larvæ found beneath driftwood along the seashore at Kukak Bay, Alaska, July 2, 1899.

No American representative of this genus has hitherto been reared. The larvæ described above resemble closely those of *Cryptohypnus riparius*, described by Schiödte from Europe.

LEPTALIA MACILENTA Mann.

[Plate XXV, figs. 8-12.]

Larva white, except head and pronotum, which are of a yellowish tinge; extreme anterior margin of the front and mandibles brown; form elongate, cylindrical, broadest at the pronotum, gradually narrowing to the third abdominal segment, fourth to sixth segments of about equal diameter, seventh and eighth slightly swollen and longer, ninth short, broadly rounded posteriorly. Length 15 mm.

Head rounded, broader than long, anterior margin broadly truncate, posterior angles rounded, dorsal surface flattened, shining, frontal margin but slightly thickened or coriaceous, frontal angles reduced to small tubercles. Ocelli five, in two series; first series consisting of three ocelli arranged close together in a transverse line on the lateral margin of the head behind the antennæ; second series of two ocelli, situated a short distance behind the first set. Clypeus transverse, trapezoidal, four times as broad as long. Labrum semicircular, twice as broad as long with a dense fringe of fine hairs on the anterior margin. Mandibles triangular in outline, apex acute with a prominent rectangular tooth near tip on inner margin; articular condyle close to the extreme outer angle of the base. Antennæ minute, not exceeding the clypeus, three-jointed; first joint cylindrical, twice as long as broad; second one-third the length of first, slightly narrower, third joint minute, conical, with a stout seta at apex. Maxilla reaching nearly to the apex of mandible; cardo as large as stipes, irregularly triangular in outline; stipes produced apically to form a lobate galear process, which is thickly setate on its inner margin; maxillary palpi three-jointed, basal joint stout, the following joints successively shorter and more slender. Mentum broadly rounded at the tip, which is finely pubescent, outer margin bearing three setæ near the center; palpi widely separated at base, three-jointed, first and second joints equal in length, third small, conical.

Pronotum transverse, two and one-third times as broad as long, angles broadly rounded, dorsal surface flattened. Mesonotum and metanotum transverse, short, diminishing in width. Legs a little longer than the maxillæ; coxæ short, stout; femora and tibiæ cylindrical, subequal in length, the tibiæ more slender; claw simple. Abdominal segments, except eighth and ninth, bearing both dorsally and ventrally a pair of locomotor callosities.

Described from larvæ found in the stumps of decaying alder bushes on Popof Island, Alaska, July 10, 1899. This is the only known American representative of this genus.

CHRYSOMELA SUBSULCATA Mann.

[Plate XXVI, figs. 1-7.]

Larva pink, shading into red on the dorsal surface, pronotum brown, head and legs black; dorsal surface delicately granulate and with numerous minute tubercles each surrounded by a small spot of brown; form stout, almost semicircular in outline when reviewed from the

side, strongly convex above, flattened beneath, abdomen broadest towards the posterior end. Length 7 mm.

Head broader than long, subglobose, delicately granulose; median impressed line well developed, front with a deep fovea on each side. Clypeus transverse, short, slightly emarginate in front, rounded at the sides. Labrum twice as broad as long, the frontal margin bilobate and deeply incised in the center. Mandibles stout, flattened, broad at base, narrowing towards apex, which is crowned by a series of fine sharp subequal teeth, the tips of the teeth in a regular curve. Antennæ extremely small and short, apparently three-jointed, the basal joint button-shaped, the second much smaller and of similar form, the third minute, conical. Ocelli six, arranged in two series; a group of four, arranged in the form of a square, just behind the antennæ; a second group of two ocelli, immediately below that organ. Maxillæ as long as the mandibles; cardo small, fusiform; stipes stout, quadrangular; galea elongately oval, thickly setate on inner margin towards apex; maxillary palpi not greatly exceeding galea, four-jointed, first joint large and stout, button-shaped, second of the same breadth as first but only one-third as long, third a little longer than first, but not so broad, tapering slightly, fourth joint as long as first, conical. Mentum oval, embracing the ligula, which is conical and which bears a pair of short palpi; the latter are two-jointed, the first joint very broad and short, the second longer and conical.

Pronotum longer than the mesothorax but not so broad, delicately granulate; mesothorax and metathorax similar in appearance to the succeeding abdominal segments. Legs short and stout with a few scattered setæ.

Dorsal scutes of the abdomen each divided by a transverse furrow into an anterior and posterior convex area; each area bears across its middle an irregular row of small tubercles which are surrounded by brown dots and bear at their tips very minute setæ.

Pupa short, compact, dorsal surface moderately convex; pronotum set with numerous fine bristles; dorsal abdominal segments with a row of bristles along their posterior margin; terminal segment bearing a stout spine at apex. Length 7 mm.

Described from larvæ and pupæ found beneath moss on St. Paul Island, Alaska, in the month of August. The larvæ feed upon the dwarf willows, but remain hidden during the daytime.

LEPIDOPHORUS LINEATICOLLIS Kirby.

[Plate XXVI, figs. 8-12.]

Larva white except head, which is yellow; apodous; body cylindrical, fusiform, arcuate; dorsal surface traversed by numerous transverse grooves and rounded ridges, giving the dorsulum a wrinkled appearance; pleuræ with a row of rounded elevations; ventral surface somewhat flattened, ridged and grooved similarly to the dorsulum. Length 8 mm.; thickness 2.5 mm.

Head light yellow, shining, about one-half as broad as the pronotum, broadly truncate in front, rounded behind, convex above, flattened beneath. Clypeus separated from the epistoma by a strong suture, twice as broad as long, rounded at the sides. Labrum semicircular in outline, densely ciliate on the anterior margin. Antennæ rudimentary, reduced to a rounded papilla above the bases of the mandibles. Mandibles stout, tapering gradually to the apex which terminates in two obtuse dentations. Maxillæ elongate; cardo distinctly developed, one-third the length of stipes; stipes four times as long as wide, arcuate externally, with a few setæ along the margin, emarginate within apex produced to form a rather indefinite galear process, which is thickly set with setæ on its inner margin; maxillary palpus slightly exceeding the galear process, two-jointed, basal joint stout, orbicular, second smaller, conical. Mentum not distinctly separated from the hypostome, oval, rounded in front; palpi short, two-jointed, outer joint as long as basal one but not so thick.

Pronotum oval, transverse, convex, with a few scattered hairs; mesothorax and metathorax, short, similar in appearance to the succeeding abdominal segments; abdominal segments nine, the last one conical; spiracles located on the latero-dorsal aspect of the body, minute, yellow.

Pupa white, closely resembling adult beetle. Length 7 mm.

Described from numerous larvæ and pupæ found buried in the soil beneath the roots of grass, St. Paul Island, Alaska.

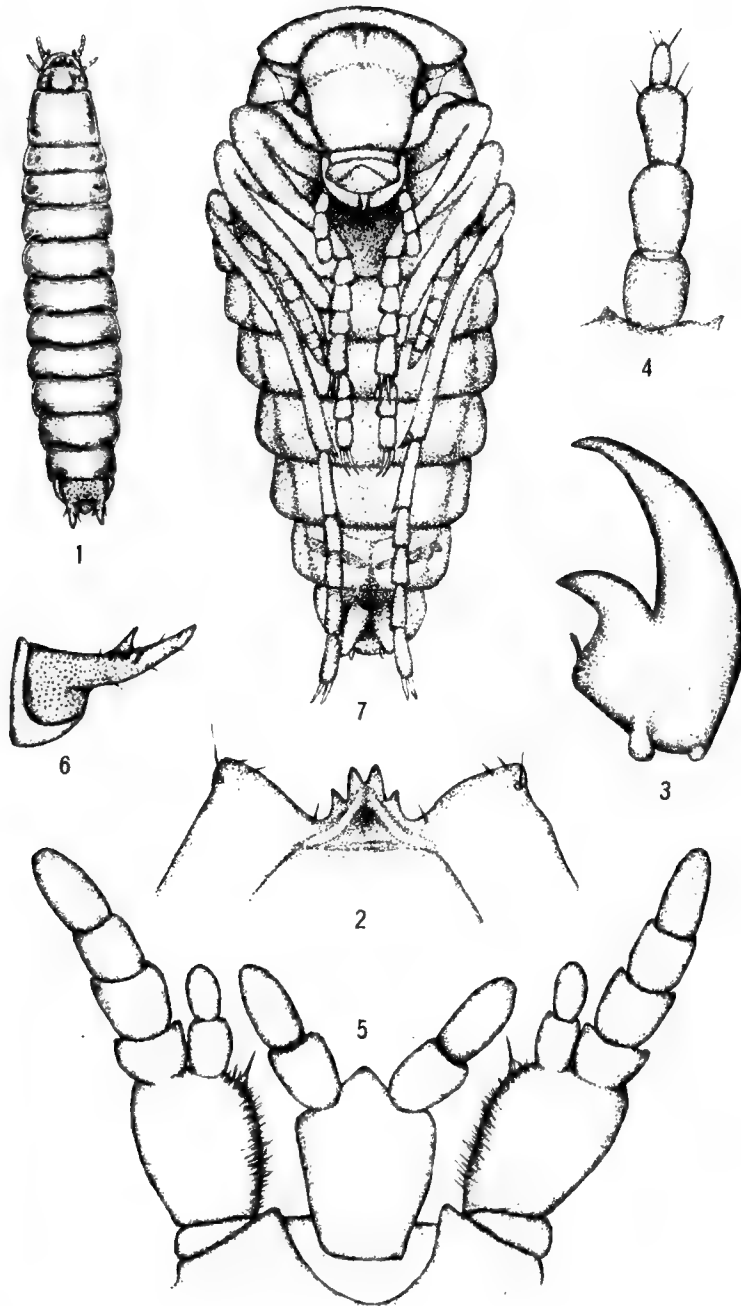
This is the only known American representative of this genus.

PLATE XIII.

[Proc. Wash. Acad. Sci., Vol. II, Pl. XXII.]

Carabus truncaticollis Fisch.

- FIG. 1. Dorsal view of adult larva ($\times 3$).
2. Anterior margin of the head ($\times 35$).
3. Mandible ($\times 35$).
4. Antennæ ($\times 35$).
5. Maxillæ and labrum ($\times 35$).
6. Side view of the ninth abdominal segment.



METAMORPHOSES OF ALASKA COLEOPTERA



PLATE XIV.

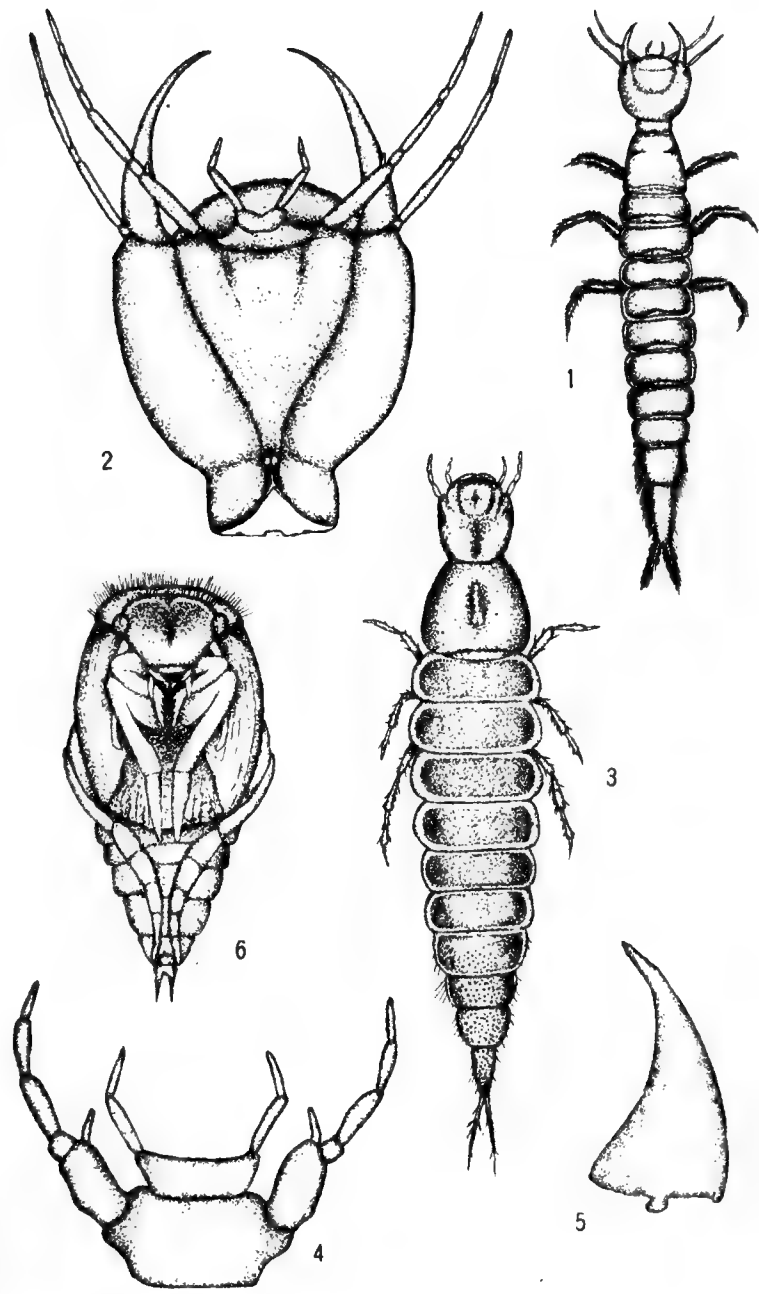
[Proc. Wash. Acad. Sci., Vol. II, Pl. XXIII.]

Dytiscus dauricus Gebler.

- FIG. 1. Dorsal view of larva ($\times \frac{1}{2}$).
2. Under surface of the head ($\times 6.5$).

Agabus tristis Aubé

- FIG. 3. Dorsal view of larva ($\times 7.75$).
4. Maxillæ and labrum ($\times 35$).
5. Mandible ($\times 35$).
6. Ventral view of pupa ($\times 7.75$).



METAMORPHOSES OF ALASKA COLEOPTERA

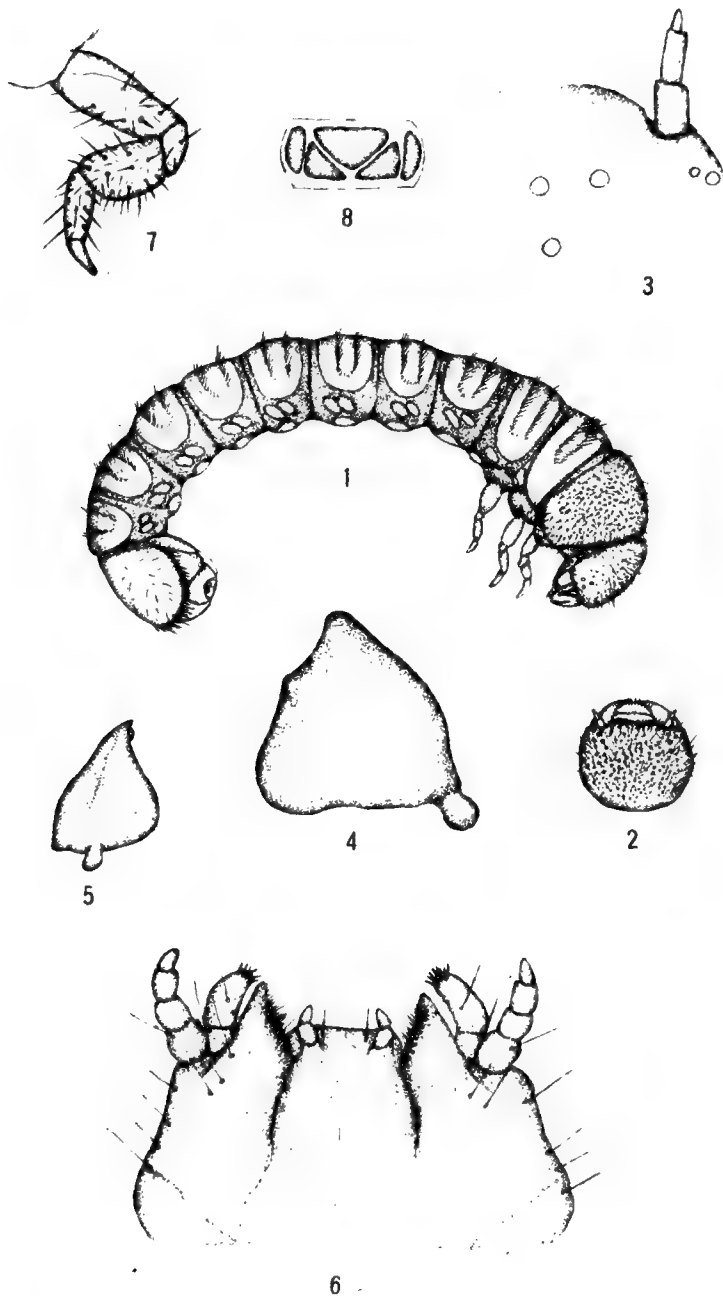


PLATE XV.

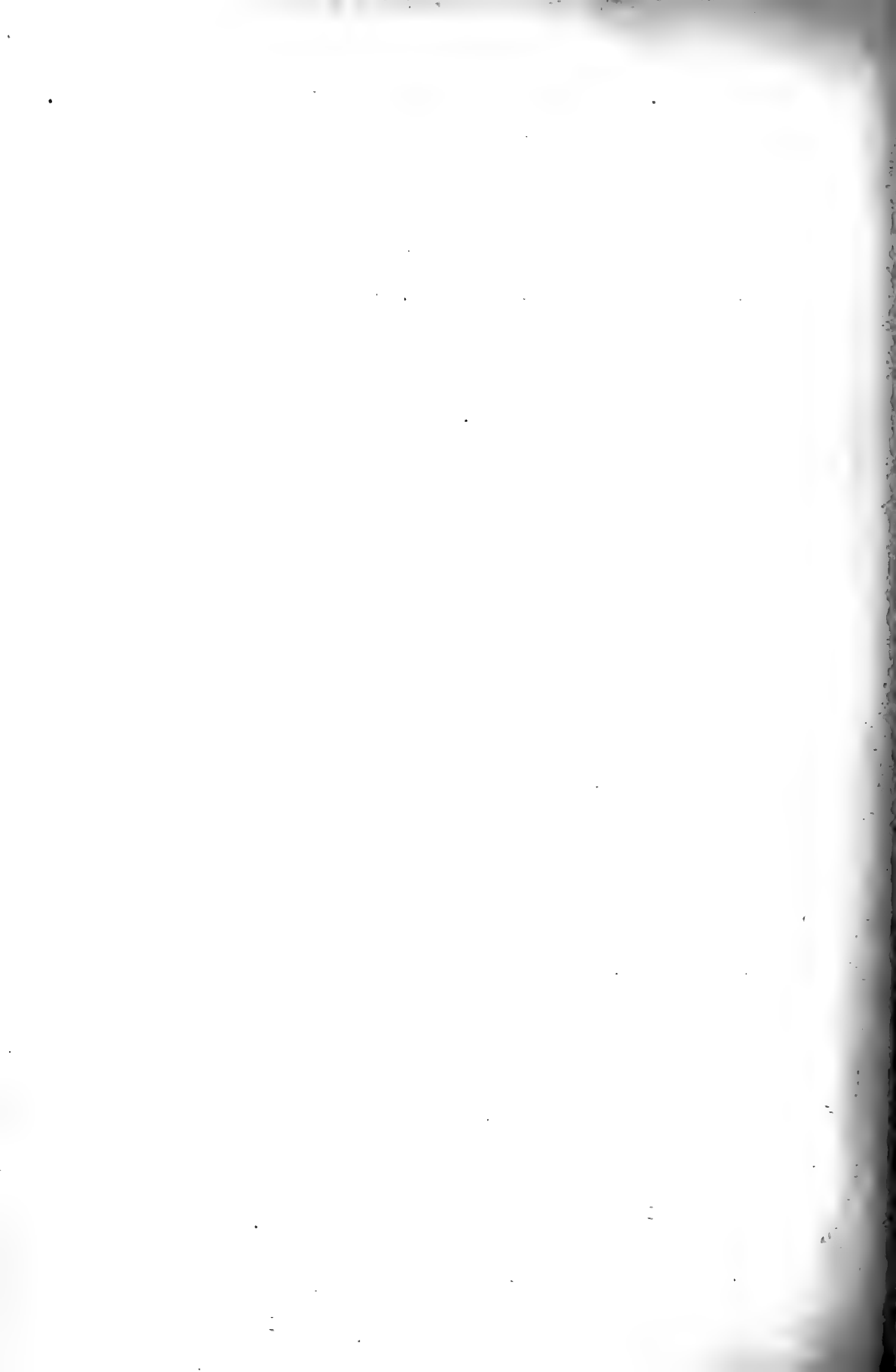
[Proc. Wash. Acad. Sci., Vol. II, Pl. XXIV.]

Byrrhus fasciatus Fabr.

- FIG. 1. Lateral view of larva ($\times 4.3$).
2. Dorsal view of head.
3. Antennæ and ocelli ($\times 35$).
4. Mandible of adult larva ($\times 35$).
5. Mandible of young larva ($\times 35$).
6. Maxillæ and labrum ($\times 35$).
7. Leg ($\times 35$).
8. Ventral schlerites of an abdominal segment.



METAMORPHOSES OF ALASKA COLEOPTERA



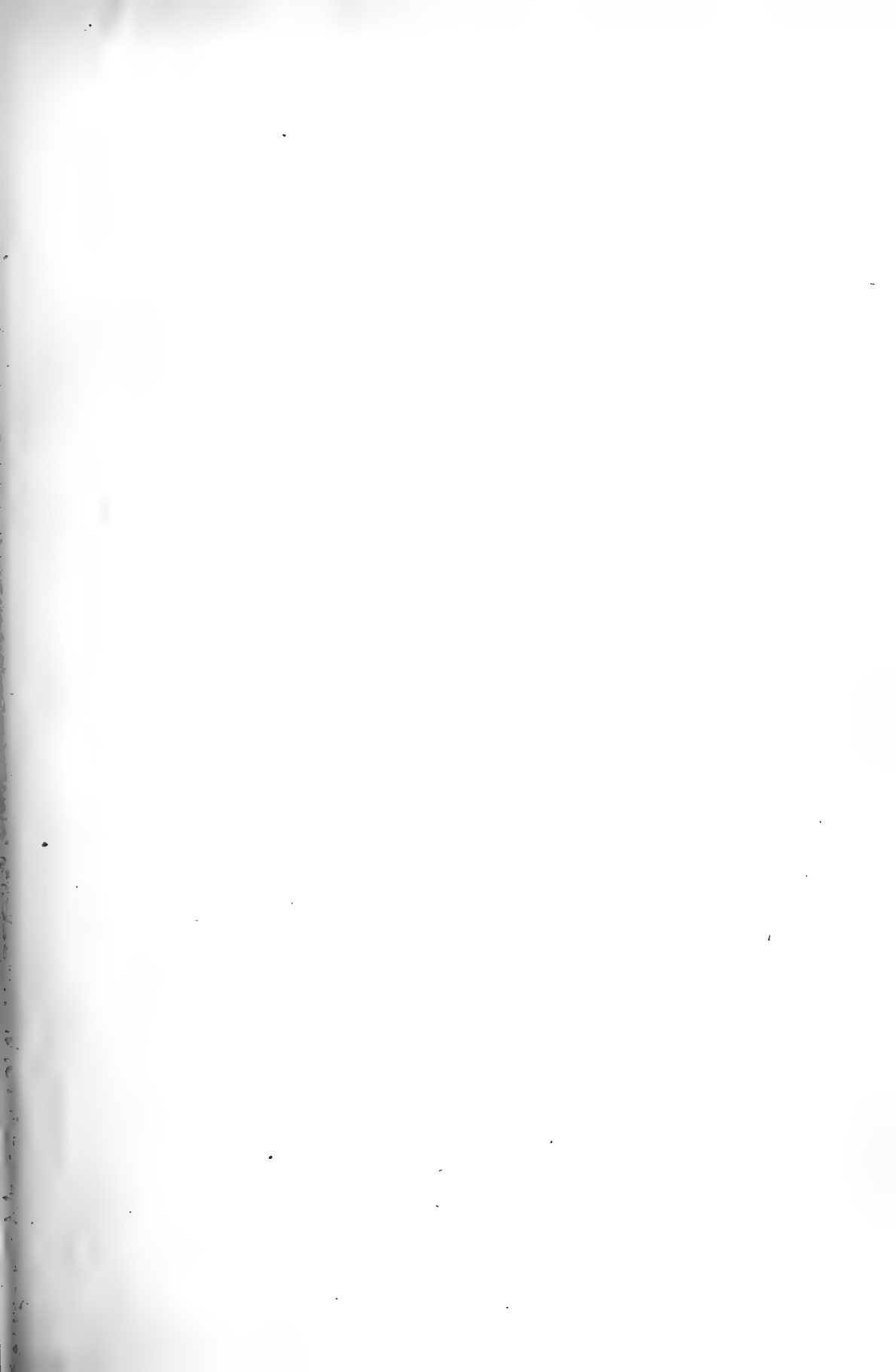


PLATE XVI.

[Proc. Wash. Acad. Sci., Vol. II, Pl. XXV.]

Cryptohypnus littoralis Esch.

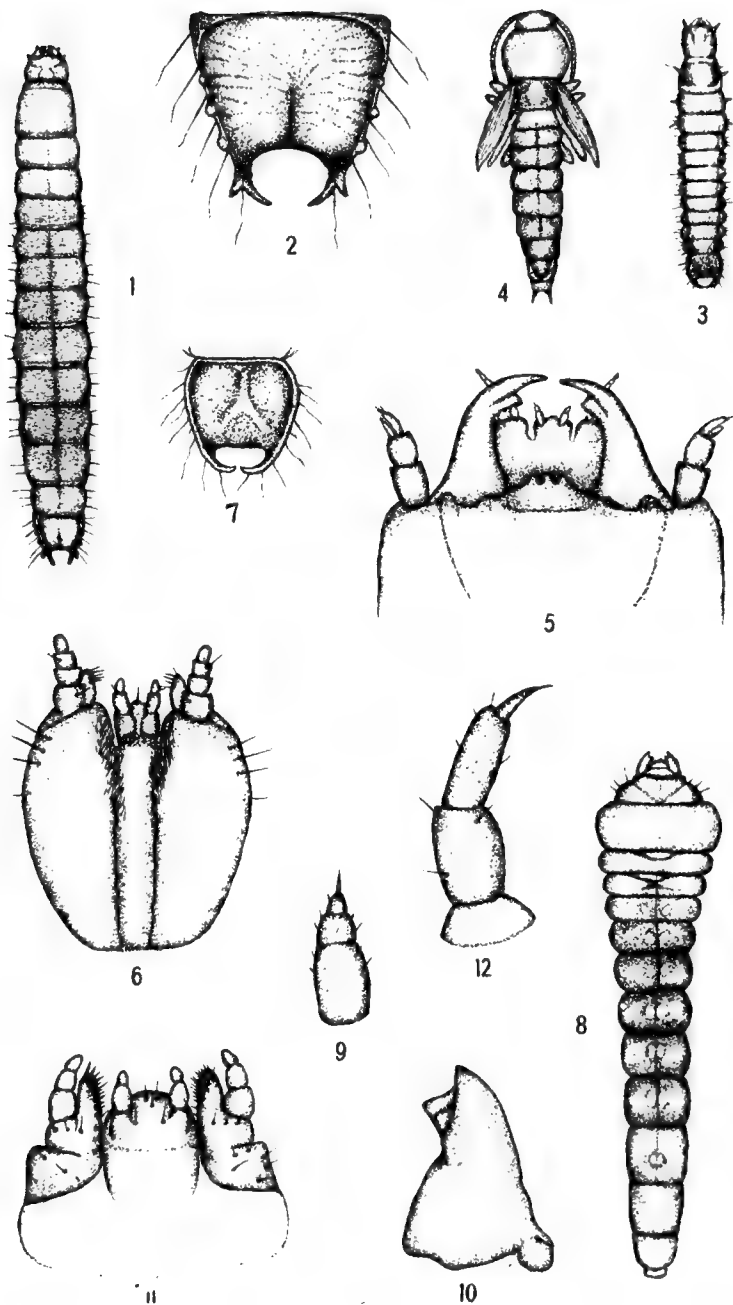
- FIG. 1. Dorsal view of full-grown larva.
2. Upper surface of ninth abdominal segment.

Hypnoides musculus Esch.

- FIG. 3. Dorsal view of full-grown larva ($\times 5$).
4. Dorsal view of pupa ($\times 8$).
5. Anterior region of the head, from above.
6. Maxillæ and labrum ($\times 75$).
7. Ninth abdominal segment from above.

Leptalia macilentia Mann.

- FIG. 8. Dorsal view of larva.
9. Antennæ ($\times 75$).
10. Mandible ($\times 35$).
11. Maxillæ and labrum ($\times 35$).
12. Leg ($\times 75$).



METAMORPHOSES OF ALASKA COLEOPTERA

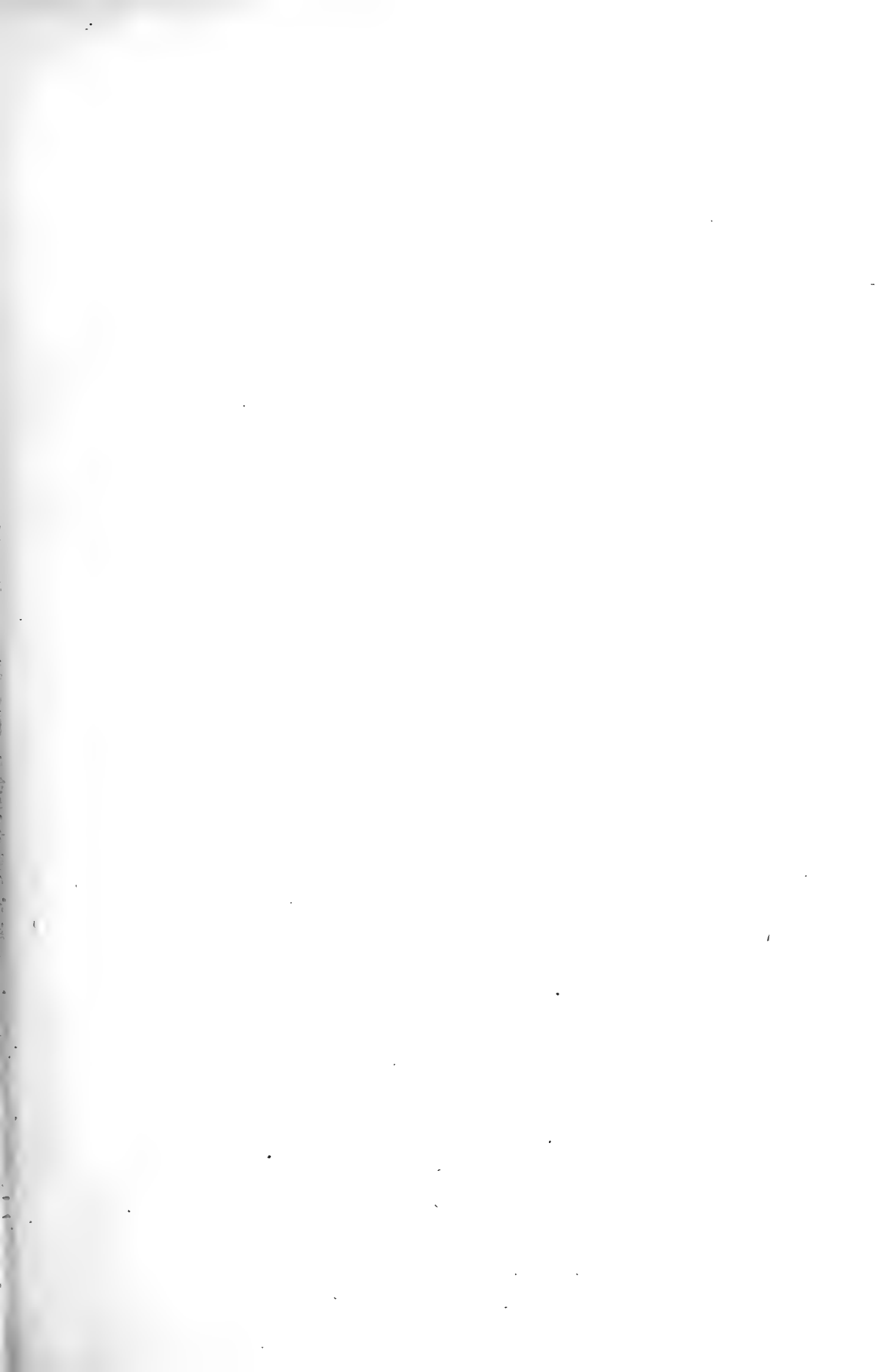


PLATE XVII.

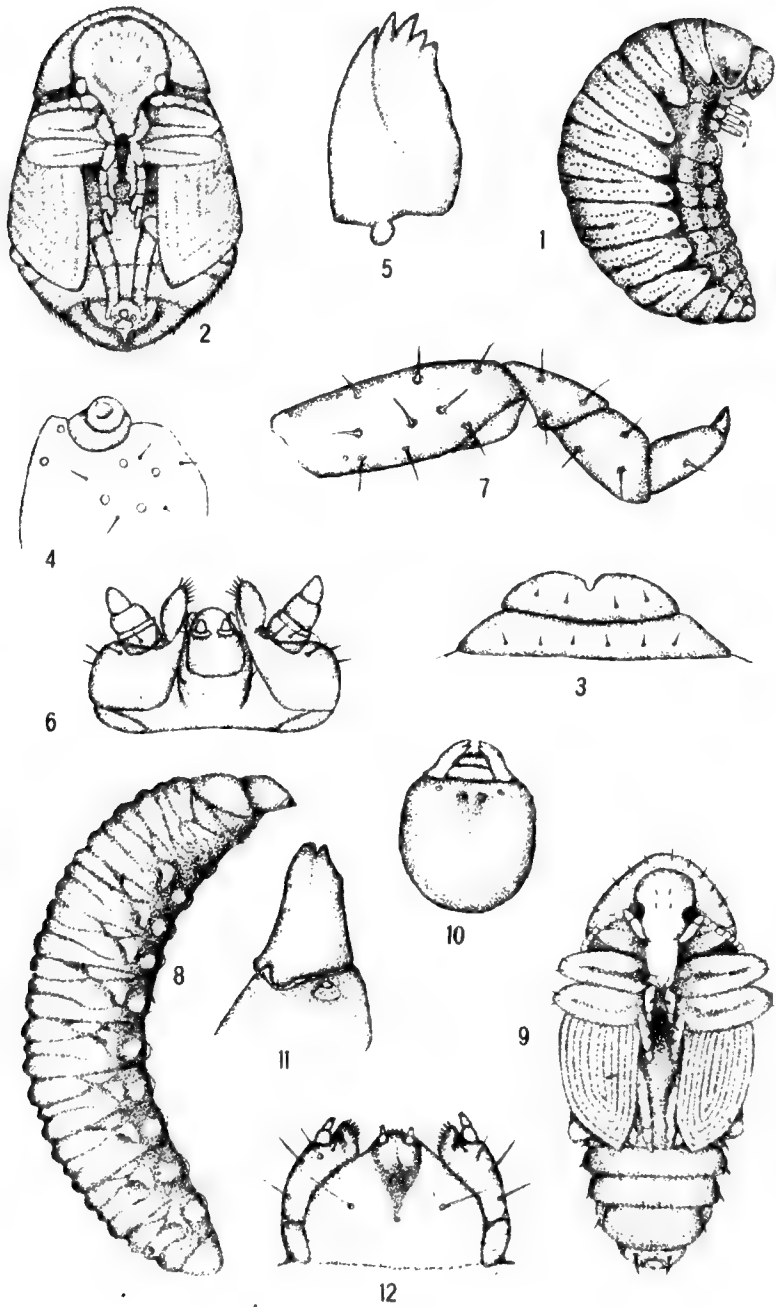
[Proc. Wash. Acad. Sci., Vol. II, Pl. XXVI.]

Chrysomela subsulcata Mann.

- FIG. 1. Lateral view of full-grown larva ($\times 6.5$).
2. Ventral view of pupa ($\times 6.5$).
3. Clypeus and labrum ($\times 35$).
4. Antennæ and ocelli ($\times 35$).
5. Mandible ($\times 35$).
6. Maxillæ and labrum ($\times 35$).
7. Leg ($\times 35$).

Lepidophorus lineaticollis Kirby.

- FIG. 8. Lateral view of larva ($\times 8.5$).
9. Ventral view of pupa ($\times 8$).
10. Dorsal aspect of head.
11. Mandible and antennæ ($\times 35$).
12. Maxillæ and labrum ($\times 35$).



METAMORPHOSES OF ALASKA COLEOPTERA

LEPIDOPTERA OF THE EX-
PEDITION

The following paper on the Lepidoptera of the Expedition, by Harrison G. Dyar, Custodian, Section of Lepidoptera, U. S. National Museum, was originally published in the Proceedings of the Washington Academy of Sciences, vol. 11, pp. 487-501, Dec. 20, 1900. It is here reprinted from the same electrotype plates, so that it may be quoted exactly as if it were the original. The original pagination has been preserved and transferred to the inner or hinge side of the page, where it is enclosed in brackets, thus [488]; while the consecutive pagination of the present volume has been added in the usual place. The present headpiece and title have been substituted for the running heading of the Academy's Proceedings and the original title, which was: *Papers from the Harriman Alaska Expedition. XII. Entomological Results (6): Lepidoptera.* No other alterations have been made.

Page 218 [492]:

Eighth line from top, for 'Caradrina punctivena Smith' read *Caradrina rufostriga* Packard.

Insert the following line of synonymy between eighth and ninth lines from top: *Lucania rufostriga* Packard, Proc. Bost. Soc. Nat. Hist., 11, 36, 1866.

Page 221 [495]:

Strike out thirteenth and fourteenth lines from bottom, and substitute the following: *Not hitherto recorded from North America.*

Twelfth line from bottom, for 'Mesoleuca lacustrata Guen.' substitute *Gypsochroa designata* Rott.

Strike out eleventh line from bottom and substitute: *Gypsochroa designata* Rott., Naturf., xi, 85, 1777.

Strike out eighth and ninth lines from bottom and substitute the following: *Named for me by the late Dr. Geo. D. Hulst as Mesoleuca lacustrata Guen., evidently by some inadvertence.*

Seventh line from bottom for 'montanata Borkh' read *munitata* Hübner.

Strike out sixth line from bottom and substitute the following: *Petrophora munitata* Hübner, Schmett. Eur. 346, 1803.

Second line from bottom, omit clause "I would determine the species as *munitata*, not *montanata*."

Page 222 [496]:

Fifth line from top, omit 'also.'

Eleventh line from top, for 'munitata Hübn.' read *pomæriaria* Eversm.

Strike out twelfth line from top and substitute the following: *Petrophora pomæriaria* Eversm., Faun. Volg.-Ural., 417, 1844.

Strike out fourteenth and fifteenth lines from top and substitute the following: *The specimens nearly correspond with European examples; the differences may be due to their condition.*

Page 223 [497], omit ninth and tenth lines from top.

Page 227 [501]:

Third line from bottom, for 'occidentella Dyar' read *coloradella* Kearfott.

Strike out second line from bottom and substitute the following: *Choreutis coloradella* Kearfott, Jour. N. Y. Ent. Soc., 10, 123, 1902.

Add to last line: *The specimen is one of Mr. Kearfott's types.*

EDITOR.



LEPIDOPTERA OF THE EXPEDITION

BY HARRISON G. DYAR

THE following species of Lepidoptera were collected by Professor Trevor Kincaid and other members of the Harriman Expedition, which visited various points on the coast and outlying islands of Alaska in the summer of 1899. In this connection the reader is referred to papers by Dr. Holland in the 'Entomological News,' Vol. XI, which treat of the Lepidoptera of the inland region.

Family PARNASSIIDÆ.

Parnassius smintheus Doubl. & Hew.

Parnassius smintheus, DOUBLD. & HEW, Gen. Diurn. Lep., pl. 4, 1847.

Six specimens: Kadiak, July 4, 5; Kukak Bay, July 5.

Family PAPILIONIDÆ.

Papilio machaon Linn. var. *aliaska* Scudd.

Papilio machaon LINN. var. *aliaska* SCUDD., Pr. Bost. Soc. Nat. Hist., 12, 45, 1869.

One female: Fox Point.

Family NYMPHALIDÆ.

Brenthis myrina Cram.

Brenthis myrina CRAM., Pap. Exot. 2, 189, B. C., 1779.

Thirty-two examples of both sexes: Kukak Bay, July 5; Kadiak, July 20 (the latter somewhat worn).

Brenthis frigga Thunb. var. **saga** Staud.

Brenthis frigga THUNB., var. *saga* STAUD., Stett. Ent. Zeit., 350, 1861.

Five examples: Popof Island, July 12-15.

Brenthis pales Schiff. var. **alaskensis** Holl.

Brenthis pales SCHIFF. var. *alaskensis* HOLL., Ent. News, 11, 383, 1900.

One example: Mainland near Shumagin Islands (Mr. Palache).

Vanessa milberti Godt.

Vanessa milberti GODT., Enc. Meth., 9, 307, 1819.

Two examples: Fox Point.

Family AGAPETIDÆ.

Cænonympha kodiak Edw.

Cænonympha kodiak EDW., Trans. Am. Ent. Soc., 2, 375, 1869.

Seventeen examples: Kukak Bay, July 5; Kadiak, July 20.

The specimens vary considerably in color, some dark-gray, some partly ochraceous, and others with marked orange shading over disk of fore wings (var. *yukonensis* Holl.), scarcely distinguishable from *inornata* Edw. from Vancouver Island. The species is at best a local form of *C. typhon* Rott. of Europe.

Cneis semidea Say var. **nigra** Edw.

Cneis semidea SAY var. *nigra* EDW., Butt., 3, pl. 9, Chion., 1894.

One female: Kadiak, July 4.

This form, without a distinct band on hind wings (var. *nigra* Edw.), seems to be the prevailing one in Alaska. The U. S. National Museum has a male example from Davis Inlet (Turner).

Family PIERIDÆ.

Eurymus palæno Linn.

Eurymus palæno LINN., Syst. Nat., 2, 764, 1767.

Four examples, one a male: Kukak Bay, July 5; Kadiak, July 20.

Rather smaller than the European *palæno* and the male has the marginal band a little narrower, but the females have the band as broad or broader than European females, thus forming connecting links to the inland Alaska form which Dr. Holland calls *chippewa* Edw. (Ent. News, XI, 418, 1900.)

Pieris napi Linn.

Pieris napi LINN., Faun. Suec., 271, 1761.

Twenty-two examples.

Var. bryoniæ Ochs.

One female: Muir Inlet, June 11.

Var. hulda Edw.

Eighteen examples: Kadiak, July 20; Cook Inlet, July 21; Kukak Bay, July 5; Juneau, July 25; Popof Island, July 13; mainland near Shumagin Islands, July (Mr. Palache).

Var. acadica Edw.?

Three examples: Kukak Bay, July 5.

Rather smaller than the figure of *acadica* Edw. and the gray dusting of secondaries more extensive.

Family LYCÆNIDÆ.**Chrysophanus dorcas** Kirb.

Chrysophanus dorcas KIRB., Faun. Bor. Am., 4, 229, pl. 4, 1837.

Thirteen examples: Kadiak, July 20; Cook Inlet, July 21.

The specimens vary enough to easily cover Edwards' description of *florus*, which is thus seen to be simply a synonym of *dorcas* Kirb.

Family HESPERIDÆ.**Pamphila palæmon** Pall.

Pamphila palæmon PALL., Reise 1, 471, 1771.

Five examples: Kukak Bay, July 5.

Family ARCTIIDÆ.**Platarctia parthenos** Harr.

Platarctia parthenos HARR., Agassiz, Lake Sup., 390, 1850.

Three examples: Kadiak, July 5; Popof Island, July 13.

All very red, the wings and thorax strongly tinged with red, the spots of fore wings large and yellowish.

Platarctia subnebulosa Dyar.

Platarctia subnebulosa DYAR, Ent. News, 10, 130, 1899.

Two examples: Point Clarence, St. Paul Island.

Both females with the wings only partly expanded. One example is very red, the marks of fore wings reduced, leaving extensive yellow areas; the other has the normal markings, but blackish brown, not strongly reddened.

Nemeophila plantaginis Linn.

Nemeophila plantaginis LINN., Syst. Nat., 1, 501, 1758.

Twelve examples: Kadiak, July 1-20.

Var. petrosa Walk.

Nine examples.

Var. modesta Pack.

Three examples.

All the *petrosa* are males, all the *modesta* females, which is also the case with the specimens in the U. S. National Museum collection.

Family NOCTUIDÆ.**Noctua c-nigrum** Linn.

Noctua c-nigrum LINN., Syst. Nat., 1, 576, 1758.

Eight examples: Popof Island, July 13-15; Kadiak, July 20.

Hadena basilinea Fab.

Hadena basilinea FAB., Mant. Ins., 2, 183, 1787.

One example: Sitka, June 16.

The example was submitted to Professor John B. Smith, who says:

A rubbed female not quite so reddish as in the normal examples; but, I believe it without question the same. It differs from the eastern *finitima* in the grayer, less contrasting maculation which is also less clearly written. From the normal European examples it seems to differ in being a little more powdery; but this may be due to the condition of the specimen.

Hadena pluviosa Walk.

Hadena pluviosa WALK., Cat. Brit. Mus. Lepid., 33, 725, 1865.

One example: Kukak Bay, July 4.

This example also was submitted to Professor Smith. He says:

One male in poor condition. This determination is open to considerable doubt, for the specimen is larger and darker than the Washington examples before me; but I find nothing else nearer, and do not feel justified in describing it as new.

Hadena vultuosa Grote.

Hadena vultuosa GROTE, Proc. Ac. Nat. Sci. Phil., 420, 1875.

Two examples; Sitka; Orca, June 27.

Hadena ducta Grote.

Hadena ducta GROTE, Bull. Geol. Surv., 4, 176, 1878.

Five examples: Popof Island, July 9-15; Pyramid Harbor.

Hadena tenera Smith.

Professor Smith has prepared the following description of this new form:

Hadena tenera sp. nov.

Ground color of head, thorax and primaries a rusty, red brown. Collar a little darker, tipped with an indistinct, richer brown transverse line. Patagia somewhat smoky shaded. Dorsal tuftings distinct, rusty brown. Abdomen dull gray with distinct, rusty-brown dorsal tufts, and rusty, fine hair. Primaries with a narrow, black basal streak and a short black streak along the inner margin at the inner angle. Basal half line black, broken, geminate, included space more yellowish. Transverse anterior line geminate, black, even, inner portion partly lost; as a whole with a very even, not greatly marked outcurve. Transverse posterior line geminate on the costa, outer portion lost, inner narrow, black, lunulate, followed by a somewhat more yellow shading, only a little incurved below the cell. Subterminal line yellowish, somewhat diffuse, forming a small W on veins 3 and 4. A series of small, terminal lunules. Claviform moderate, concolorous, incompletely black margined, a black line extending from its tip to the transverse posterior line. Orbicular ovate, oblique, irregular, a little paler than the ground color. Reniform large broadly kidney-shaped, partly annulate in yellowish, inwardly margined with black scales. Secondaries whitish at base, shading to smoky, with an obscure, smoky, extra median line and a small discal spot. Beneath powdery reddish gray, with a powdery outer line and discal lunule; disc of primaries a little darker.

Expands 36 mm. = 1.44 inches.

Habitat.—Kukak Bay, Alaska, July 4, 1899.

One male in fair condition, save that the primaries are rubbed at the outer margin and have lost the fringes. The antennæ are distinctly serrate and the processes bristle tufted. The species is allied to and somewhat resembles a small *barnsii*. The thoracic vestiture is more dense than usual and somewhat loose, perhaps as a defect.

Type.—Cat. no. 4844, U. S. National Museum.

Hyppa rectilinea Esp.

Hyppa rectilinea ESP., Schmett. Abd. Nat., 1, 127, 1777.

Six examples: Kukak Bay, July 4.

Seems to correspond with the European species rather than with the eastern *xylinoides* Guen. or the western *indistincta* Smith.

Pachnobia carnea Thunb.

Pachnobia carnea THUNB., Mus. Nat. Ac. Ups. Diss., 4, 56, 72, f. 1, 1788.

Thirty-eight examples: Popof Island, July 10-15; Kukak Bay, July 4; Unga Island, July 21.

The specimens vary in color from reddish to gray. An example was submitted to Professor Smith for determination.

***Pachnobia alaskæ* Grote.**

Pachnobia alaskæ GROTE, Bull. Buff. Soc. Nat. Sci., 3, 84, 1876.

Five examples: Popof Island, July 12-13; St. Paul Island, August 7.

One specimen is a female and the wings are not expanded. Named by Professor Smith.

***Caradrina punctivena* Smith.**

Caradrina punctivena SMITH, Trans. Am. Ent. Soc., 21, 77, 1894.

Three examples: Virgin Bay, June 25.

Professor Smith, on seeing the best specimen, remarked: "One very decent male. It is a little larger than the average specimens from Manitoba and British Columbia; but is otherwise practically the same. The nearest mate to it is an example from Laggan, British Columbia."

***Ommatostola popofensis* Smith.**

As this proved an undescribed species, Professor Smith has made the following:

Ommatostola popofensis sp. nov.

Head, thorax and primaries dull luteous. Head a trifle deeper color, the clothing even. Thorax immaculate, vestiture dense, loose, neither collar nor patagia defined. Abdomen a paler shade of clay yellow, rather smoothly clothed, untufted. Primaries with a somewhat more reddish shade a little beyond the middle, enclosing and relieving the reniform. The latter is moderate in size, centrally constricted, upper portion not well defined; lower somewhat dilated, black filled, narrowly outlined in white. Transverse anterior line obsolete. Transverse posterior line traceable by the deeper shade and a few black scales on the veins. Subterminal line a little irregular, traceable by a narrow, very slightly darker preceding shade. Veins through terminal space black-marked; but irregularly so. Fringes dusky at tip. The orbicular spot is transversely oval, traceable with difficulty by a very slightly paler outline. Secondaries black, fringes yellow. Beneath pale luteous; primaries a little smoky on the disk, with a smoky outer line and obvious discal lunule; secondaries with a small discal dot.

Expands 35 mm. = 1.40 inches.

Habitat.—Popof Island, Alaska, July 15, 1899.

One female in good condition. The species is totally different in appearance from *lintneri*, yet seems to be fully congeneric with it. Its general appearance is hadeniform until the fine yet dense vestiture recalls some forms of *Leucania*.

Type.—Cat. no. 4843, U. S. National Museum.

***Anarta lanuginosa* Smith.**

One example, which Professor Smith characterizes thus:

Anarta lanuginosa sp. nov.

Black and gray; primaries with a mossy green shade through the median space; secondaries straw yellow, with a broad black outer band and a black discal lunule. Head black with an admixture of white, especially prominent on the vertex. Collar gray tipped, above smoky blackish. Patagia gray edged, black vestiture of thoracic disc gray tipped posteriorly. Abdomen blackish, densely clothed with fine, yellow hair, through which the black ground appears smoky. Primaries with ornamentation well defined, the markings broken or incomplete. Basal space chiefly gray. Basal line black, single, curved toward the base. A curved black mark in the submedian interspace, above which are mossy scales. A black bar along the internal margin, beyond which are mossy scales to the transverse anterior line. This line single, broad, black, broken on the veins, only a little irregular, as a whole outwardly oblique. Transverse posterior line single, consisting of a series of black interspaceal lunules, a little drawn in below the cell. Subterminal space smoky or blackish on the costa, the dark shade narrowing abruptly and broken into black sagittate spots varying in size, which precede a very even, whitish subterminal line. Fringes black, tipped with white, cut with white on the veins, giving a neat, festooned appearance. Claviform moderate, incompletely outlined in black, filled with paler green and followed by a paler, mossy shading. Orbicular of moderate size, irregular, incompletely black margined, whitish, with a mossy overlay, the whitish shade extending along the median vein to the reniform. Reniform moderate in size, a little constricted, black margined, not sharply defined, whitish filled, with a smoky central shading. Secondaries with yellow fringes. Beneath pale yellow, with large black discal spots. Primaries with black subterminal band shading into a smoky terminal space. Secondaries with a broad marginal band; fringes yellow.

Expands 35 mm. = 1.40 inches.

Habitat.—Popof Island, Alaska, July 12, 1899.

This is the best marked species known to me, equalling *richardsoni* in size, with somewhat the same type of maculation. A single male in very good condition. The antennæ are distinctly serrated, the teeth furnished with tufts of bristles, so the member becomes brush-like.

Type.—Cat. no. 4845, U. S. National Museum.

Anarta etacta Smith.

One example, described by Professor Smith, at our request, as follows:

Anarta etacta sp. nov.

Head white with an admixture of smoky scales. Collar white inferiorly, then blackish, the tip gray. Patagia whitish, with a submarginal blackish line, edges gray. Thoracic disc smoky. Primaries dull gray, powdered with mossy green. The ordinary lines are white, marked by geminate blackish spots on the costa and edged with black

scales along their course. Basal line obvious, evenly bidentate. Transverse anterior line distinct, oblique, a little dentate on the veins to the submedian interspace, then with a long inward tooth on the internal vein, below which it curves outward to the inner margin. Transverse posterior line somewhat squarely exerted over the cell, then incurved so that it touches the lower edge of the reniform. Terminal space whitish with a mossy tinge, the subterminal line denticulate, defined only by the color contrast between terminal and subterminal spaces. A series of black terminal lunules. Fringes smoky, tipped with white, which is cut with smoky. Claviform moderate, outlined in pale mossy green. Orbicular round, of moderate size, annulate with white, which is edged with black, center of ground color. Reniform of good size, annulate with white, among which some green scales are intermixed; inwardly edged with black scales, center of ground color. A little heel extends backward from the reniform along the median vein for a short distance. Secondaries pale smoky, with blackish terminal lunules which are preceded by whitish. Fringes soiled whitish. Beneath smoky, secondaries a little paler, with a small discal spot.

Expands 36 mm. = 1.44 inches.

Habitat.—Kukak Bay, Alaska, July 4, 1899.

One female without antennæ, but otherwise in fair condition. The white markings on the dull gray ground are well defined and characteristic, the white terminal space adding to the contrast. It is probable that the amount of green powdering is variable and that, normally, there is more of it than is shown on the type.

Type.—Cat. no. 4845, U. S. National Museum.

***Plusia hochenwarthi* Hoch.**

Plusia hochenwarthi HOCH., Act. Soc. Berol., 6, 337, 1785.

Two examples: Kukak Bay, July 4.

***Plusia epsilon* Ottol.**

One example: Kadiak, July 20.

This was submitted to Dr. R. Ottolengui who sends us the following description:

Plusia epsilon sp. nov.

Head, thorax and primaries dull purplish with black shadows; thoracic edge of collar, patagia and tip of thoracic tuft of lighter shade. Transverse anterior line fairly straight, indistinct, purplish above the median vein, below the vein distinct, metallic golden, composed of two feeble outward curves, the upper longer than the lower, both bordered outwardly with black. The sign is metallic golden. Seen with the wings folded, that on the wing to the right represents the Greek character ε, while on the other wing, the sign being reversed, resembles the numeral 3. The sign touches the median vein at both extremities and, while apparently continuous with the transverse anterior line, really does not reach it. There is no dot, though this is an evanescent

character in some species. The subterminal line is geminate, waved, lighter at the outset, beginning with a hook on the costa and showing a few golden scales at the lower end, especially on the small tooth opposite the sign. The median space below the sign is the darkest part of the wing, the deepest black being immediately next to the sign. The subterminal line is black and shows distinctly against the paler shade between it and the fringes. It is sharply angulate and dentate. The two teeth at the center of the line are sharp, but near its anal angle there is no sharp tooth as in allied species, the angle being rounded. Fringes gray, cut with blackish. Orbicular indistinct, purplish, lined with black. Reniform upright, concolorous, outlined by faint metallic scales. Secondaries smoky yellowish basally with a wide darker outer border. Beneath, primaries smoky with yellowish discal spot, the white spots in costa and in fringes showing more distinctly than above. Secondaries much lighter.

Expanse 34 mm.

Habitat.—Alaska.

Type.—Cat. no. 5256, U. S. National Museum.

***Hypena californica* Behr.**

Hypena californica BEHR., Trans. Am. Ent. Soc., 3, 23, 1870.

One example: Virgin Bay, Prince William Sound, June 25.

Professor Smith saw this specimen and said: "Does not differ in any notable particular from British Columbia examples. One ragged female."

Family GEOMETRIDÆ.

***Mesoleuca variata* Schiff.**

Mesoleuca variata SCHIFF., Syst. verz. Wien. geg., 110, 1776.

Twelve specimens: Popof Island, July 12–15.

Determined by Rev. Dr. Hulst as a "small variety" of *Mesoleuca truncata* Hufn., but I cannot agree with this determination.

***Mesoleuca lacustrata* Guen.**

Mesoleuca lacustrata GUEN., Phal., 2, 395, 1857.

One example: Yakutat, June 21.

Named by Dr. Hulst; but it is distinctly different from Eastern examples of this species.

***Petrophora montanata* Borkh.**

Petrophora montanata BORKH., Nat. Eur. Schmett., 5, 397, 1794.

One example, large: Popof Island, July 10. Sixteen examples: Popof Island, July 9–15; Kukak Bay, July 4.

One of the latter examples was submitted to Dr. Hulst, who pronounced it a very light variety of the same species; I would determine the species as *munitata*, not *montanata*.

Petrophora nemorella Hulst.

Petrophora nemorella HULST, Trans. Amer. Ent. Soc., 23, 293, 1896.

Five examples: Yakutat, June 16; Popof Island, July 12-15; Kodiak, July 20; Saldovia, July 21. This will prove to be *munitata* also, I believe.

Petrophora borealis Hulst.

Petrophora borealis HULST, Trans. Am. Ent. Soc., 23, 292, 1896.

Nine examples: Berg Bay, June 10; Sitka, June 16; Yakutat, June 16; Virgin Bay, June 25; Kukak Bay, July 4. Some of the specimens are remarkably close to *P. ferrugata* L.

Petrophora munitata Hübn.

Petrophora munitata HÜBN., Schmett. Eur., 346, 1803.

Two examples: Yakutat, June 16, 21.

Determined by Dr. Hulst, but wrongly, I think. The specimens more nearly resemble the Siberian *P. quadrifasciaria* Cl.

Venusia cambricaria Curt.

Venusia cambricaria CURT., Brit. Ent., pl. 759, 1839.

One example: Sitka, June 16.

Euchæca albovittata Guen.

Euchæca albovittata GUEN., Phal., 2, 520, 1857.

One example: Sitka, June 16.

Hydriomene trifasciata Borkh.

Hydriomene trifasciata BORKH., Eur. Sch., 5, 308, 1794.

Four examples: Yakutat, June 16; Orca, June 21.

Tetracis hyperborea Hulst.

One example, which Dr. Hulst describes as follows:

Tetracis hyperborea sp. nov.

Expands 42 mm. Palpi bright ochre yellow; front ochre; summit and anterior part of thorax ochre yellow; thorax and abdomen rather light ochre, the latter somewhat fuscous stained; all wings light ochre more or less stained with fuscous; fore wings with basal line showing in three blackish spots, the largest costal, the next at middle of wing, the third at vein 1; just beyond the discal spot, which is very faint, is a broad blackish shading, nearly straight, and reaching across wing; an outer line of black spots on veins, these diffuse on their edges and running subparallel to outer margin to vein 2, then curved a little outwardly; a line of faint diffuse marginal spots; hind wings with outer line of black dots on the veins; discal spots present, blackish. Beneath as above, on fore wings the basal half more fuscous, discal spots

more distinct, middle band much less marked, outer line more distinct, the spots confluent; hind wings, discal spots very distinct, black; outer line of spots more distinct than above.

Virgin Bay, Prince William Sound, Alaska, June 25.

Type.—Cat. no. 4919, U. S. National Museum.

***Eustroma silacea* Hübn.**

Eustroma silacea HÜBN., Vög. & Schmett., 100, 1793.

One example: Kukak Bay, July 4.

Submitted to Dr. Hulst, who called it a very light form of *Eustroma atrocolorata* Grt. & Rob., but obviously incorrectly.

***Tephroclystis perfusca* Hulst.**

Tephroclystis perfusca HULST, Can. Ent., 30, 116, 1898.

Four examples: Popof Island, July 9–15.

Determined by Dr. Hulst as a varietal form of this species.

***Tephroclystis zygænidata* Pack.**

Tephroclystis zygænidata PACK., Mon. Geom., 51, 1876.

Four examples: Sitka, June 16; Yakutat, June 21.

This also is a varietal form, not the typical species, according to Dr. Hulst's determination.

***Tephroclystis miserulata* Grt.**

Tephroclystis miserulata GRT., Proc. Ent. Soc. Phil., 2, 32, 1863.

Two examples: Popof Island, July 15.

Again a varietal form of the Atlantic coast species, according to Dr. Hulst, who examined a specimen.

***Tephroclystis flebilis* Hulst.**

One example, which, being new, is described as follows by Dr. Hulst:

Tephroclystis flebilis sp. nov.

Expands 24 mm. Palpi front and antennæ dark fuscous; thorax fuscous in front, fuscous gray behind; abdomen gray, very light laterally; fore wings narrow, elongated, fuscous, darker, almost blackish fuscous narrowly along costa and broadly outwardly extending over marginal field; the black of costa broken as showing the beginning of cross lines, and broadened into a subquadrate spot within outer line; basal line scarcely evident; outer line broad, indeterminate, whitish; an outer scolloped dentate white line on outer field, parallel with margin; hind wings rather small, rounded, fuscous, the beginnings of dark cross lines showing along inner margin; marginal lines on all wings black, more or less broken. Beneath much as above, but with a rounded broad extra-discal line on hind wings.

Sitka, Alaska, June 16.

Type.—Cat. no. 4920, U. S. National Museum.

***Eucymatoge grandis* Hulst.**

Eucymatoge grandis HULST., Trans. Am. Ent. Soc., 23, 273, 1896.

One example: Sitka, June 16.

Named by Dr. Hulst.

***Rheumaptera lugubrata* Staud.**

Rheumaptera lugubrata STAUD., Cat. Lep. Eur., 189, 1871.

Twenty-four examples: Sitka, June 16; Kukak Bay, July 4.

***Rheumaptera hastata* Linn.**

Rheumaptera hastata LINN., Syst Nat., 527, 1758.

Eighteen examples: Sitka, June 16; Metlakahtla, June 4; Yakutat, June 21; Kukak Bay, July 4; Kadiak, July; Popof Island, July 9-13; Fox Point, July 28.

Family PYRALIDÆ.

***Pyrausta washingtonialis* Grote.**

Pyrausta washingtonialis GROTE, Bull. Geol. Surv., 6, 577, 1882.

Five examples: Sitka, June 16; Virgin Bay, June 25; Kukak Bay, July 4; Popof Island, July 13.

In some of the specimens the markings are nearly obliterated. We are indebted to Professor C. H. Fernald for the determination of a specimen.

***Scoparia centuriella* Schiff.**

Scoparia centuriella SCHIFF., Wien. Verz., 319, 1776.

Nineteen examples: Popof Island, July 12 and 13.

***Crambus labradoriensis* Christ.**

Crambus labradoriensis CHRIST., Ent. Zeit. Stett., 19, 314, 1856.

Four examples: Kukak Bay, July 1; Saldovia, July 21.

***Crambus toparius* Zell.**

Crambus toparius ZELL., Ent. Zeit. Stett., 155, 1866.

Four examples: Sitka, June 16.

***Crambus interminellus* Walk.**

Crambus interminellus WALK., Cat. Brit. Mus., 27, 156, 1863.

Four examples: Yakutat, June 21; Popof Island, July 12 and 13; Saldovia, July 21.

Determined by Professor Fernald. Hampson makes this a synonym of *trisectus* Walk.

Laodamia fusca Haw.

Laodamia fusca HAW., Lep. Brit., 493, 1829.

Eight examples: Juneau, June 25; Kukak Bay, July 1.

Family PTEROPHORIDÆ.

Platyptilia cosmodactyla Hübn.

Platyptilia cosmodactyla HÜBN., Samml. Eur. Schnett., 35-36, 1827.

Four examples: Sitka, June 16; Virgin Bay, June 25; Kadiak, July 20.

Determined by Professor Fernald.

Platyptilia petrodactyla Walk.

Platyptilia petrodactyla WALK., Cat. Brit. Mus., 30, 940, 1864.

Three examples: Popof Island, July 12, 13.

One specimen was submitted to Professor Fernald, but he was unable to recognize it. Another example, in somewhat better condition, seems referable here. The ground color of the wing is more ochreous than in Walsingham's figure, and the brown band is less oblique, being subparallel to the marginal band and approximate to it. There is a slight dot near base of fissure, one below end of costal stripe and one in center of cell; but the figure in general suggests this species, and it is stated that Walker's type is not in perfect condition.

Family SESIIDÆ.

Sesia culiciformis Linn.

Sesia culiciformis LINN., Syst. Nat., 493, 1758.

One example: Kukak Bay, July 1.

Sesia arctica Beut.

One example: Kadiak, July 20.

Determined as a new species and named as above by Mr. Wm. Beutenmüller, to whom it was submitted, and who favors us with the following description:

Sesia arctica Beutenmüller, sp. nov.

Male: Head, palpi and thorax entirely black. Abdomen black with a very narrow white band at the posterior edge of the second and fourth segments. Anal tuft black. Legs black with the hind tarsi dirty white. Fore wings transparent with black borders and a broad transverse mark. Hind wings transparent with a narrow black mar-

gin. Underside of fore wings washed with golden yellow, basally. Hind wings same as above. Expanse 20 mm.

Habitat.—Kadiak, Alaska, July 20, 1899.

Type (one male).—Cat. no. 5175, U. S. National Museum.

Somewhat allied to *Sesia rutilans* but has white bands on the abdomen instead of yellow ones as in that species. The palpi are wholly black, while in *rutilans* they are golden yellow and black.

A description of this species, without name, has been published by Mr. Beutenmüller.¹

Family TORTRICIDÆ.

Sciaphila argentana Ckck.

Sciaphila argentana CLKCK., Icones, 2, 14, 1759-64.

Four examples: Kukak Bay, July 4.

Sciaphila osseana Scop.

Sciaphila osseana SCOP., Ent. Carn., 238, 1763.

Eight examples: Kukak Bay, July 4; Kadiak, July 20.

Determined by Professor Fernald.

Sciaphila mœschleriana Wocke.

Sciaphila mœschleriana WOCKE, Stett. Ent. Zeit., 45, 1862.

Six examples: Popof Island, July 15.

Determined by Professor Fernald.

Sericoris bipartitana Clem.

Sericoris bipartitana CLEM., Proc. Ac. Nat. Sci. Phil., 346, 1860.

Five examples: Kukak Bay, July 4; Popof Island, July 10 to 12.

Phoxopteris kincaidiana Fern.

Ten examples: Metlakahtla, June 4; Sitka, June 16; Berg Bay, June 10; Muir Inlet, June 12.

Professor Fernald has kindly prepared the following description of this new form:

Phoxopteris kincaidiana sp. nov.

Expanse of wings 15 mm. Fore wings brownish white with a nearly triangular dark cinnamon brown dorsal spot extending from the base to the middle of the hind margin with the outer part oblique and ending in a rounded angle near the costal side of the cell. The outer and costal sides of the triangle are somewhat incurved. The oblique stripe from the middle of the costa extends about two thirds of the distance to the anal angle, then forms a right angle and extends to the apex, but is cut on its outer side beyond the end of the cell by two

¹Can. Ent., 32, 208, 1900.

dark brown dashes and there is a dark brown dot near the angle of this stripe. The oblique stripe, a series of costal dots and three cross lines at the outer part of the wing, one of which is terminal, are dark cinnamon brown but much more indistinct than the dorsal spot. Fringe above the apex dark brown, elsewhere white at the base and pale fuscous beyond. Hind wing pale fuscous.

Described from one male in the collection of the National Museum, taken June 14, 1899, at Metlakahtla, Alaska, by Mr. T. Kincaid for whom I take pleasure in naming this insect.

Type.—Cat. no. 4967, U. S. National Museum.

***Tortrix fumiferana* Clem.**

Tortrix fumiferana CLEM., Proc. Ent. Soc. Phil., 5, 139, 1865.

One example: Sitka, June 16.

Professor Fernald remarks that the specimen is too poor for him to be certain of the identification.

***Carpocapsa pomonella* Linn.**

Carpocapsa pomonella LINN., Syst. Nat., 538, 1758.

One example: Orca, June 15. (On shipboard.)

Named by Professor Fernald.

Family TINEIDÆ.

The collection in this family was small, and the condition of the specimens is such that it has not been thought desirable to make them the types of new species. The generic determinations have been made by Mr. August Busck.

***Argyrestia* sp.**

Four examples: Sitka, June 16; Popof Island, July 13 to 15.

***Monopis* sp.**

One example: Popof Island, July 13.

***Plutella* sp.**

One example: Sitka, June 16.

This appears to agree essentially with the type of *duboisella* Beut.

***Schreckensteinia* sp.**

Two examples: Sitka, June 16, Yakutat, June 21.

***Zelleria* sp.**

One example: Farragut Bay, June 5.

***Choreutis occidentella* Dyar.**

Choreutis occidentella DYAR, Can. Ent., 32, 86, 1900.

One example: Sitka, June 16.

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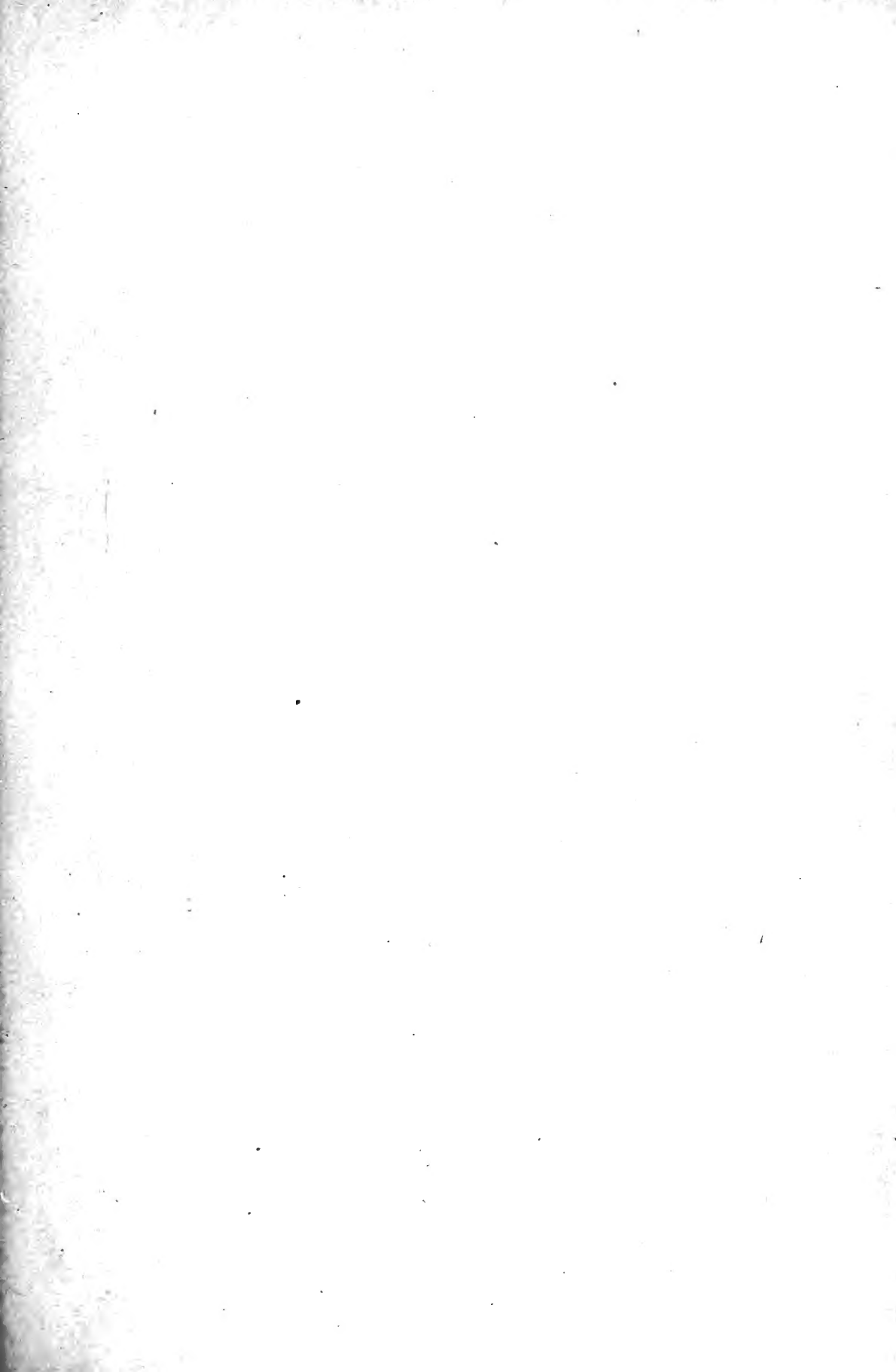
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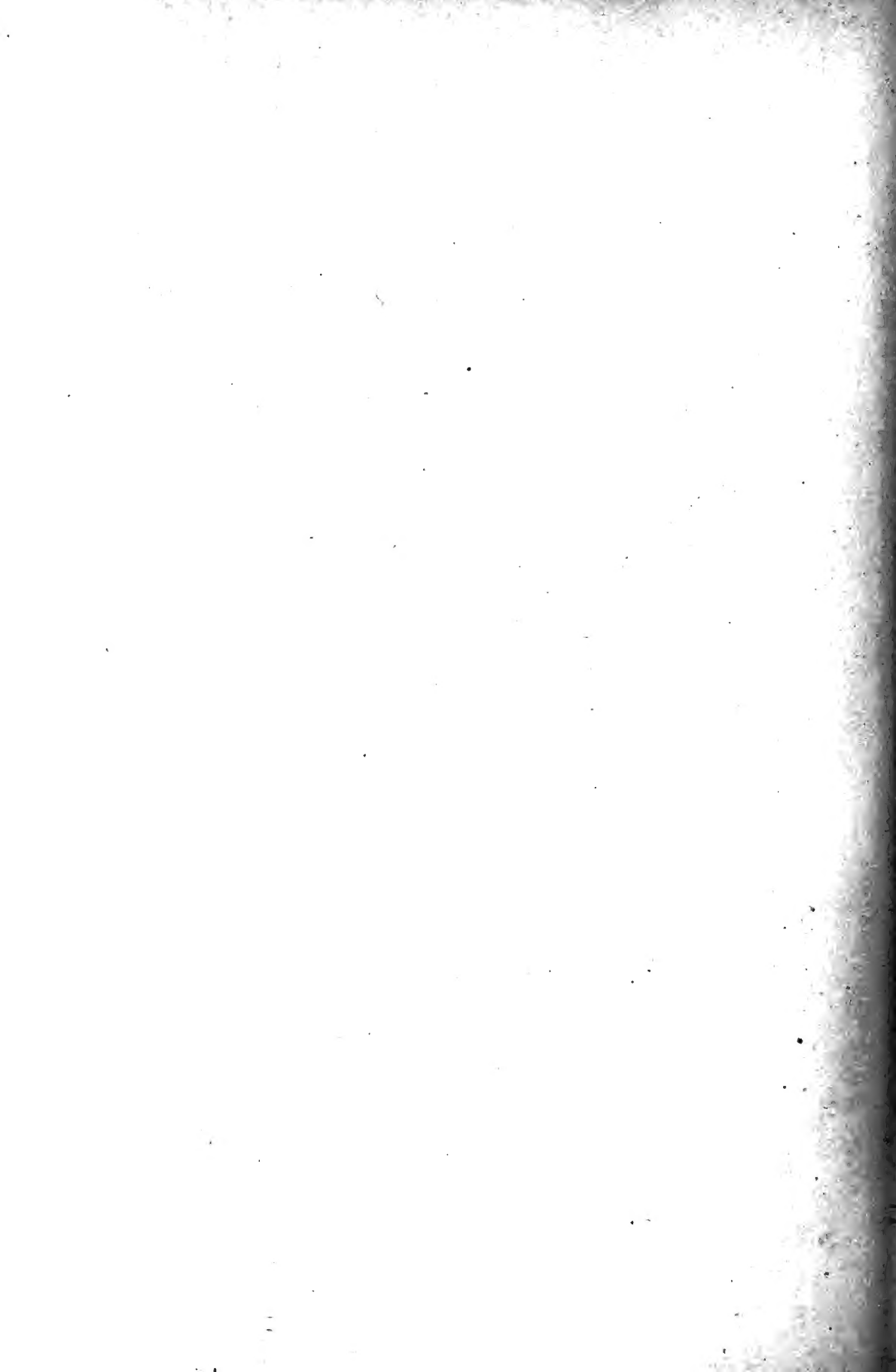
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